Telephony.

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Independent Telephone Men

By R. G. Shelden

FRANCIS DAGGER, provincial telephone expert for the government of Saskatchewan, Canada, was recently spoken of as the father of Independent telephony in Canada. Born at Liverpool, England, in 1865, at the age of twenty he had already spent four years in the telephone field. From 1885 to 1893 he had charge of purchasing, estimating and engineering for the Western Counties and South Wales Telephone Company.

This company having been amalgamated with the National Telephone Company, he became inspector and superintendent of equipment and maintenance with the latter concern, serving for five years.

In July, 1899, Mr. Dagger moved to Canada, becoming manager of the Waterloo district of the Bell Telephone Company of Canada. When the city council of Toronto took under consideration the municipal ownership of telephones he resigned this position to prepare estimates for the municipality.

At this time the Bell company had a practical monopoly of the telephone business in Canada. Little was known of the Independent movement.

The prospect of combatting single handed so strongly intrenched a monopoly might have disheartened any man not sure of his ground. But what some would have considered an obstacle, Francis Dagger regarded as an opportunity. He immediately began the study of the Independent movement in the United States.

Francis Dagger.

An able writer, his editorials and articles in the Canadian Engineer were widely quoted, and have influenced recent legislation at Winnipeg and Ottawa. His newspaper work has brought a familiarity with Independent telephony into every corner of the country.

In 1903, Mr. Dagger was engaged to make a special telephone report to Sir William Mulock, postmaster general of Canada, and was the first witness before the Dominion telephone inquiry in 1905. While acting as technical adviser to the select committee in 1905, he advised and assisted in securing valuable testimony on telephone conditions that filled over two thousand pages.

As promoter and advisor to many Independent telephone companies, he assisted Alpheus Hoover and A. F. Wilson, president and secretary of the Markham and Pickering Telephone Company, in the organization of the Canadian Independent Telephone Association.

Some idea of Mr. Dagger's energy and ability may be gathered from his work in Manitoba. In three months he covered 124 widely separated municipalities with information that assured an intelligent vote on the telephone proposition.

In July, 1907, Mr. Dagger was engaged by the Saskatchewan government and presented a report that was followed by the present legislation, empowering government construction and operation of long distance lines, municipal ownership of town systems, and assistance to small rural companies. He is a staunch advocate of local ownership of local systems.

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Editorial Department

TELEPHONY'S 1908 DIRECTORY.

CONVINCING evidence of the magnitude and importance of the telephone industry will be found in TELEPHONY'S new "Directory of the Telephone Industry."

TELEPHONY has for some years past published a "Directory" or "Mailing List," at least once a year, and in the earlier stages of the industry, when changes were frequent and new companies were being rapidly organized, it was found necessary to issue every quarter. This in itself will doubtless appeal to students of telephone economies as a striking commentary upon the present stability of the field. The industry is developing at such a rapid pace that there are more new companies listed in the 1908 "Directory" than in any previous issue. It is also disclosed by comparison with previous Directories that the majority of city systems are increasing from 25 to 30 per cent per annum, while the rural field is developing even faster. The northwest has shown the greatest development of the past year and presents excellent prospects for some years to come.

During the past four years the Independent field has more than doubled. It has to-day approximately 3,500,000 subscribers and represents an investment of over $400,000,000. Pretty rapid for any industry which was but a weakling amidst hostile surroundings only a few years ago.

TELEPHONY'S "Directory" for 1908 presents the names and headquarters addresses of 11,500 operating telephone companies, of which all but about 400 are in the United States.

Something to a field like that!

Canada substantiates its claims of "coming to the front" by showing 334 companies this year, as against 80 listed in 1907. Iowa still heads the list of states both numerically and from the standpoint of money invested, with no immediate danger of her being soon displaced. There are 2,578 telephone companies in Iowa to-day—Sweden please take notice. Of these 2,578 Iowa companies, over 1,500 are farmer lines or rural companies, averaging from 20 to 30 subscribers each, while 500 are good-sized city plants and the remainder important systems, covering entire counties or groups of counties. It would appear that another telephone could hardly be wedged into Iowa sidewise and yet more instruments continue to go there every year than to any other state in the Union saving one. Iowa not only insists upon being fully represented, telephonically speaking, but believes in being correctly represented. Many of the state's older systems are being overhauled each year—new apparatus installed and up-to-date construction adopted. This also applies in a large measure to several other states, notably Ohio, Indiana, Illinois and Michigan—states which were built quite early in the Independent movement. And this recalls the prediction recently made by an engineer of highest standing, to the effect that more apparatus would be sold and more building done within the next three years than during any similar period of the telephone industry.

TELEPHONY hopes and believes that this is true and will accordingly prepare for a "hummer" next year.

Many other interesting things are disclosed by the new 1908 "Directory." Turning through its 472 pages, we find but few large commercial centers not yet covered by the Independents. Among the important citadels yet to capitulate are New York, Cincinnati, New Orleans, Boston and Chicago. In the two last named, franchises already have been granted, but franchises are by no means the only essential for a telephone system. Millions of dollars will be required to build competitive plants in cities of the size above named. This done, however, (which is sure to come very soon) and the Independents will have the country fairly covered. In thirty-four of the moderate sized cities—those ranging in size from 5,300 to 20,000—the Independents have secured the majority of business, in many places displacing the Bell entirely.

The "paragraph symbol" (¶), preceding many companies in TELEPHONY'S "Directory," indicates long distance lines. There are enough of these to remind us forcibly once more of the crying need of great Independent trunking lines, linking together the more important of these toll line systems—another matter which will require time and labor, and some money.

TELEPHONY'S 1908 "Directory" is marked by at least one other very gratifying feature—a marked increase in its advertising patronage. Despite the so-called "hard times," the exceptional merits of the book as an advertising medium have been recognized by 210 different advertisers—more than is carried by all the other mediums of the field combined, TELEPHONY excepted.

The publishers often wonder how many appreciate the cost and labor expended upon the production of the "Directory." It is an almost endless task in detail. The repeated circularizing of the entire telephone field for the collection of data, the sorting, verifying, editing, proof reading, etc., all require time and careful attention. Thousands of dollars have been devoted to the improvement of the book, year by year, and we believe that the 1908 edition will be found worth the effort.

The telephone field needs such a manual—needs it badly as a business auxiliary and to further development—and TELEPHONY naturally was looked to for its publication. However, we have had some able assistance. TELEPHONY here and now returns its acknowledgements to the International Independent Telephone Association, to the various state associations, to many state officials and to a number of the leading telephone men in all parts of the country and Canada for the able and generous assistance rendered. It is such things as these, as well as the business placed in it which make TELEPHONY feel that its "Directory" is appreciated by every one in the telephone field.

AN IMPORTANT SERIES OF ARTICLES.

IN THIS issue we begin an important series of articles by Clarence Mayer, formerly cost statistician and facilities engineer, Chicago Telephone Company, and author of "Telephone Construction, Methods and Cost."

Mr. Mayer has for many years made a special study of construction costs, and is an author of considerable prominence, both in the telephone and other fields. In successive articles Mr. Mayer will describe the practice of estimating, comparative cost of brick and concrete vaults, reconstruct-

ing and extending a telephone plant, reconstructing and extending a farm line, and constructing an underground conduit; methods and costs being given in each article.

The costs are taken from actual cost records secured by special cost men under the supervision of and through a system devised by Mr. Mayer. We believe this is the most important series of articles ever published on these subjects.

SOME SOUND GOSPEL.

THE value of telephone competition and the evil effects of a monopoly such as the Bell has tried to perpetuate in the United States are most convincingly pointed out in the address delivered by A. C. Lindemuth, president of the International Independent Telephone Association, before the West Virginia and Indiana conventions. As an argument showing why the Independent telephone movement has prospered under apparently the most discouraging condition, President Lindemuth's address is unanswerable. It contains also much food for thought for those whose minds have turned toward the idea of connection with the Bell. The old adage that "a burnt child fears fire" is reason enough to induce Independents long in the fight to frown upon an alliance with the monopoly that pursued its competitors so relentlessly in the past.

President Lindemuth points out that when an Independent company connects with the Bell in any form it loses its identity as an Independent concern and becomes a part of the Bell system, even though it retains its Independent connections in other directions. As the president pertinently says: "The Independent company is joined to the Bell system, and the Bell is never joined to the Independent system." It is so regarded by the general public and especially by the Bell—which always propagates and urges that theory, and is significant of the motive of the monopoly to seek to build up its own system and dismember the Independents.

Attention is also called to the fact that the attempt of the Bell to starve out the Independents by buying out the Independent telephone manufacturers' plants is only another way of the opposition to destroy competition and create a monopoly for itself in the telephone business of the country. This effort, Mr. Lindemuth contends, is clearly illegal, and one that the courts will reckon with in upholding the interests of the Independents for the welfare of the public at large. From this premise it is only a logical step to the conviction that any combination, merger or physical connection between the Bell and Independents which tends to crush competition and make either a monopoly in the telephone business is unlawful and subjects the parties participating therein to criminal prosecution.

It is interesting and reassuring to Independents to note in this connection that the International association has an ample fund at its disposal to secure the enforcement of laws in this patricular and repel the attacks of the Bell which is seeking in every way to kill or absorb the Independent companies which have given the monopoly such a struggle in numerous parts of the country. President Lindemuth says: "All approaches or conspiracies on the part of our common competitor looking towards the formation of unlawful mergers, combinations or agreements should receive no recognition whatever by any Independent telephone company because if consummated they would be destructive of competition and detrimental to the best interests of the general public and the Independent companies themselves, and are in plain violation of law."

TELEPHONY prints in this issue President Lindemuth's address in full, and invites particular attention to its telling points. His comments on the inevitableness of competition in the telephone field are especially timely, and his reasoning as to why the Independents are bound to have the great telephone system is based on undeniable facts. Small wonder, then, that the Bell is overturning heaven and earth to make alliances with members of the Independent movement. Equally well founded is the declaration that the telephone business is stable and enduring, even under the most trying conditions, when other industries are seriously pinched, as was witnessed during the period of business depression last fall and winter.

In short, President Lindemuth's address is a resolute telephone sermon of optimism, and—better than all—he advances sound reasons for being optimistic. Under his guidance the International association is doing telling service for the Independent movement, and its fruits are already appearing.

THE TRADE PAPER'S VALUE.

LESS spectacular than the daily press, but equally—if not more—valuable, the trade paper has become an indispensable factor in every day life. The existence of one or more flourishing publications in every line of human endeavor is proof that they fill a genuine want and perform services valuable to the industry with which they are affiliated.

Charles S. Redfield of the Yale and Towne Manufacturing Company, of New York, recently read an interesting paper before the joint banquet given by the Trade Press Association and the Space Club, in Chicago, on the general subject of advertising, in which, in passing, he made some reference to the position of the trade paper.

"Before leaving the publishers," said Mr. Redfield, "I want to express my great appreciation of the good trade paper and the splendid work it does for its readers and advertisers. There is a most decided want to be filled; and it fills it. Business could not go on properly without it. The manufacturer looks to it to talk to just the people he wants to reach—with practically no waste circulation. The subscriber looks to it for advice in his purchasing and selling, the arrangement of his stock, the management of his store and the keeping of his accounts; the good trade paper gives him all of these things. The merchant and the manufacturer should count it among their greatest blessings that there is to-day at least one good and indispensable trade paper in practically every field.

"The manufacturer who overlooks his trade paper, the merchant who fails to take one or more, are deliberately handicapping themselves on the road to success."

Coming from an expert like Mr. Redfield, this tribute to the utility of the trade paper for both subscriber and advertiser is worthy of more than ordinary consideration. The good trade paper has a mission in the world and succeeds proportionately as it fulfills that mission. Without becoming personal, TELEPHONY thinks all will agree that the Independent telephone movement owes not a little of its success to the aid and co-operation of the journals which have faithfully represented it.

TELEPHONE HELP ELECTION DAY.

IOWA politicians recently found the telephone a most useful and effective means to induce voters to go to the polls on election day. At Des Moines arrangements were made with the telephone companies and the morning of the fateful day the operators at the exchanges called up all the voters who have telephones and courteously reminded them not to forget their duty as citizens. Candidates on both tickets agreed to the plan whereby the operators called up every subscriber. If the telephone was answered by a man he was greeted with a polite "Don't forget to vote to-day." If the lady of the house answered the bell she was told to "Remind Mr. Blank to be sure and vote to-day."

The result was that a much larger vote was polled than was anticipated. The telephone call proved a hundred-fold more effective than a printed notice, and is likely to become a permanent feature of campaign work in which the necessity for getting the voters aroused and inducing them to go to the polls is a prime factor. In the large cities political

managers—the men who run the campaign machinery—make an extensive use of the mails and printed matter in interesting the voters and persuading them to go to the polls election day, which, after all, is the all-important thing, for if a man doesn't go to the ballot box it matters little whom he favors. Postage and printing bills form the chief expense in political campaigns. The Des Moines experiment may tend to change this somewhat. The telephone message "Don't forget to vote to-day" reaches the right spot. It also finds the man at the right time. He is not so likely to ignore such a warning uttered in the sweet voice of the girl at "Central" as he would a circular or postal card that is delivered by an over-burdened mail carrier—maybe hours too late.

The telephone message on election day carries with it the "Do It Now" spirit, while the stereotyped printed notice usually finds a place unheeded in the waste-basket. The Des Moines plan is commended to all up-to-date political managers who want to reach the people in the right way and at the right time.

GRAND RAPIDS COMPANY'S GOOD SHOWING.

IN all probability the Citizens' Telephone Company is the most remarkable telephone company in America. Four things particularly characterize this company, and an explanation of them will prove the assertion.

First, the forty-third quarterly cash dividend of two per cent has been consecutively paid, without weakening the company in any respect.

Second, $3,000,000 worth of common stock is locally owned, and there are no first mortgage bonds, preferred stock, nor large debt.

Third, practically 30,000 telephones, connected to exchanges in first class condition, and interconnected by copper wire toll lines have been built for the money mentioned above. Who can equal it, and who can say that one dollar was ever diverted from its legitimate use?

Fourth, a splendid management and a most loyal, enthusiastic and efficient group of employes. No wonder the company succeeds. Under this management, the worst mangled property on earth would soon show results.

Before starting into an analysis of the statement, we want to show what a truly ideal condition is presented by this company. First, it honestly pays eight per cent dividends to the people, as regularly as the seasons turn. Secondly, it satisfies the public demand by giving a fair deal. In the two half years of 1906-7, the Citizens' Telephone Company charged its subscribers an average annual rental of but $17.94. Think of it, it charged the people of its district less than five cents a day for telephone service, and yet paid a decent dividend. In addition, it allowed these subscribers to communicate all over their district, and collected from each an average of only $4.02. Surely, the officials of this company could appear before any governing body without fear, and emerge with great credit.

The statement of earnings and expenses for the fiscal year closing June 30, is as follows:

EARNINGS.

Exchange rentals	$446,528.93
Long distance income	104,050.94
Other income	9,328.86
Total	$550,908.73

The total income for the year was $559,908.73. For an average of 24,884 stations, there resulted an earning of $21.96 per station year. Subdividing, the rentals per year were $17.94, and the tolls were $4.02.

Since the year end, a copper line has connected South Bend, Indiana, thus giving the company another direct southern outlet to the sister states immediately adjacent. The new exchange at Detroit has over 6,000 telephones in service, and the handicap of isolation from the state's largest city is removed. There is every reason to expect that the average toll earning will increase to $5 or possibly $6 per station. If there is but a dollar per year increase, it will add $30,000 per year to the gross earnings. This increase will come in such a way that no subscriber can complain of broken promises, which complaint usually accompanies a demand for higher rental rates.

In 1905-6 the earnings per station year were $21.96. In 1904-5 they were $21.19. In 1903-4 they were $20.95. In 1902-3 they were $19.62. Therefore, none can argue that the new business obtained in the last few years show any deteriorating quality.

The expenses were as follows:

Operating, maintenance, reconstruction and depreciation	$282,043.45
General expense, interest, taxes, etc.	59,467.57
Dividends	203,397.71
Carried to surplus	15,000.00
Total	$559,908.73

The total expense of operation was $341,611.02. For an average of 24,884 stations, the cost per station was $13.33. This is a ratio of sixty per cent, and is eminently fair, when one considers the reasonable charges made by the company. If the people had to pay a just average of $20 per annual rental and $5 for tolls, then the operating percentage of fifty-one per cent would be attained. The management of the Citizens' Telephone Company is entitled to more money from its subscribers, because it takes $13 to operate, $8 to pay dividends, and $4 more to give the company a cash renewal reserve fund. As it is, this organization gets along nicely with the $21.46. It is entitled to $25. Following are some figures bearing upon the growth of the company:

It will be noted that the expansion of the system began in 1900. In that year the capital stock of the company was $391,125, and the number of stations were 5,459. The investment per station was $71. The following year there was great activity in toll line building, and the cost per station was $80. By June, 1902, there was a great increase in the subscriber list, and lesser activity in toll line construction. So the investment per station stayed at $80. By June, 1903, the growth became active in Grand Rapids, and the cost per station rose to $90. In 1904 the investment rose to $98, as there was renewed activity in toll line work. In 1905 the investment stood at $97 and in 1906 again at $98. Finally, in 1907, we find it standing at $106.40. It was at this time that the price of labor and materials was its highest point, yet the investment per station is most moderate.

Regarding the use of additional capital, there is a well known requirement that the gross income for the first year following construction should not be less than twenty-five per cent of the investment. Let us see how this has applied to the Citizens' Telephone Company.

In the year ending June, 1901, there was expended $180,255, which resulted in an increase of gross earnings of $43,384, or twenty-one per cent. 1902 saw $275,685 invested, and an increase of $50,553, or eighteen per cent. 1903 saw an expenditure of $365,815, and an increase of $76,233, or twenty-one per cent. 1904 saw additional capital of $396,400, and a gross increase of $69,049, or seventeen per cent. 1905 saw additional capital of $301,705, and a gross increase of twenty-five per cent. 1906 saw expenditure of $413,955, and an increase in gross earings of $80,246, or nineteen per cent. And 1907, the crux of high labor and material, saw an addition of $454,695, and an increase of $61,221, or fourteen per cent. It is possible that some unusual switchboard account had to be paid when due, and that the floating debt was materially reduced, all of which is very reasonable.

A stockholder list of 2,500 and a fair demand for new issues, is a reward of forty-three consecutive quarterly dividends. The financing of this company is a wonderful feat, and after all, is a result of good common sense as well as the courage and foresight of the management. It is much

better to pay dividends regularly, and construct from proceeds of stock issues, than to put the earnings back into the plant. It may require unusual courage and energy to follow the Citizens' example, but it is well worth emulation.

STANDARD TELEPHONE APPARATUS.

A GREAT deal has been said in favor of, and perhaps fully as much against, the adoption of standards in the apparatus used by operating companies.

There can be little doubt that there is a decided tendency toward standardization; and in this connection it may be suggested that there is possibly some misunderstanding of its requirements among opponents of the system.

It is argued that adoption of any certain form of apparatus as a standard would militate against freedom of trade, and constitute a virtual monopoly for the manufacturer producing that form of apparatus, he being very likely protected by patents in its production. Such a state of affairs would obviously give rise to all the evils of monopolistic control, including high prices and arbitrary methods.

While those who array themselves against the adoption of any standards on these grounds are entirely sincere in their acceptance of the argument, its tenets are far from being unanswerable.

The fundamental error in the point of view lies in a failure to grasp the true significance of standardization as applied purely to operating conditions.

The manufacturer's idea of standard construction is almost wholly mechanical, and concerns itself most with the duplicating of parts to make them serve several purposes. On the other hand the operator does not take any great interest in the actual form of construction of any given piece of apparatus, except to assure himself of its efficiency of operation and design. His standard is based on a given value under operating conditions, and is applicable to the product of practically any manufacturer.

Take for example the settling of such apparently minor questions as the allowable space between jack springs, key springs, etc.; the material used in making such springs, such as German silver or phosphor bronze, and the tension or resistance of such springs. An insistence upon certain standard requirements on these points can work little hardship to any manufacturer, since actual mechanical construction is not interfered with.

In the operation of line signal relays there can be no question as to the desirability of standard operating value. The relay armature should always pull up at a certain known ngure of current, and should release at another definite f.gure. Once this figure has been determined, there can be no reason for a variation from it. Nevertheless, such a demand can readily be met by any manufacturer with his own form of relay.

Similarly, transmitters of a given resistance and current value offer no difficulty; and the resistances of coils for ringers, receivers, relays, induction and impedance coils have already become matters of almost standard practice. The specification of certain definite impedance and number of turns of wire would complete the standardization.

Where it is imperative that the operator's ideas of standardization encroach upon the especial province of the manufacturer, and assume the prerogative in specifying the mechanical form of apparatus used, every effort should be made to liberally construe such standards. Manufacturers in general have been to considerable expense and pains to develop the supposedly best forms of their product; the more so because of constant competition and the frequent improvements necessary. If possible, the standard adopted should be a sort of composite of the competing types, flexible enough to permit the use of any of them with little, if any, change. As a matter of fact, the best types of competing apparatus bear strong resemblance to each other in their essentials. An intelligent process of standardization should be able to overlook the non-essentials, or at least construct rules so broad as to recognize them all impartially.

To sum the matter up briefly, manufacturers should confine their standardization to features which will not restrict any reasonable demands of the operator; and operators should limit the standardizing process to those matters which cannot interfere with the exigencies of manufacture. An intelligent committee should find no difficulty in adhering to this program.

Once a fair degree of standardization has been reached, the operator will reap a number of benefits. Not the least of these will be increased efficiency and uniform operation of telephone lines. Troubles become less frequent and more easily found, which means less labor and a lower expense account.

The whole matter of operating standardization is simply this. Those functions of apparatus which are of more importance and greater concern to the operator than to the manufacturer should not be left to the manufacturer to decide. Their special features should be incorporated into the specification or order for such apparatus. And to acquaint the operator with the best conditions governing the design and use of operating apparatus, while making unnecessary that high degree of technical knowledge which the handling of non-standard equipment requires for the best results, is the proper function of standardization.

It has been shown that standardization does not mean perfection; but neither should it interfere with the logical development of scientific improvement. To wait until the highest possible state of excellence along any line had been reached before adopting a standard in that line would simply mean in effect the abandonment of all ideas of standardizing. The point where further development and improvement is impossible will never be reached. It represents the unattainable hundred per cent of efficiency, our very striving for which is responsible for the changes we seek to eliminate.

It may be found a difficult matter to establish our standards securely on the narrow line between positive, final decision and the broad, indefinite field of future improvement. But it is only a question of intelligent application and thorough study; and once attained, such a position is safe both from the rust of stagnation and from the equally dangerous disorder of a multiplicity of designs.

Even to those who most decidedly oppose its adoption, the problem presented by the demand for standardization cannot but be interesting. It involves that feature which is the very heart of the telephone business—constant improvement. And when the basic fact is recognized that we may have standardization without stagnation, it will achieve its ultimate realization and success.

OHIO TELEPHONE COMPANIES INCREASE.

AT A recent stockholders' meeting of the Local Telephone Company of Bellevue, Ohio, it was unanimously voted to increase the capital stock from $400,000 to $600,000. F. A. Knapp, the president and general manager, stated that the clamor for telephones in the company's territory was as great as ever, and had to be met.

The Local company has about 4,500 telephones and 300 miles of toll line connected, and it is stated that these figures can be doubled with little effort.

A motion was made and carried to allow the directors to use their own discretion at any time they saw fit to change the incorporation of the company from Delaware to Ohio.

The stockholders of the Mt. Vernon Telephone Company of Mt. Vernon, Ohio, have also decided to increase the capital stock of the company from $250,000 to $350,000, to take care of demands for its service. Frank L. Beam was re-elected president.

THE RICHMOND EXCHANGE

One of the Most Flourishing Independent Telephone Systems in the Middle West

By O. G. Hottinger

THE Richmond Home Telephone Company of Richmond, Indiana, was incorporated February 10, 1899, by E. L. Barber, James S. Brailey Jr., John M. Lontz, James W. Moore, Arthur C. Lindemuth, Perry J. Freeman, and Webster Perry. The local members of the organization being among the most prominent and influential business men of the city, the success of the company was assured from the outset.

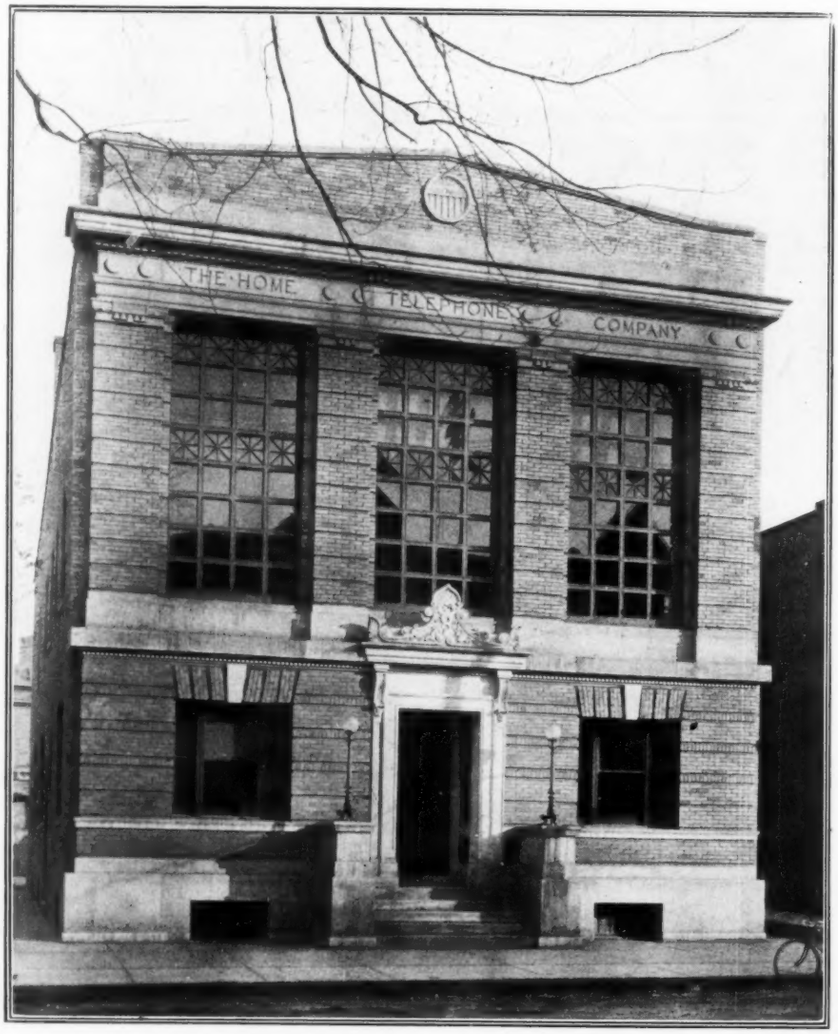
A franchise was immediately granted to the five last men above mentioned. It being passed under suspension of the rules, the first information the local Bell manager had that an Independent company was even thought of was when one of the Bell officials of Indianapolis, Indiana, telephoned to him the following day that a franchise had been granted in Richmond.

The company became active immediately, and within three or four months an entire plant was established. The American Electric Telephone Company's magneto flashlight transfer system was used, with an installation of 800 lines, ultimate capacity 2,000.

The growth of the company was beyond all expectations and January 1, 1907, it had in actual service over 2,300 telephones, while the local Bell telephone company had less than 500; and a great many of these telephones were, and are now, giving free service, but with no apparent success.

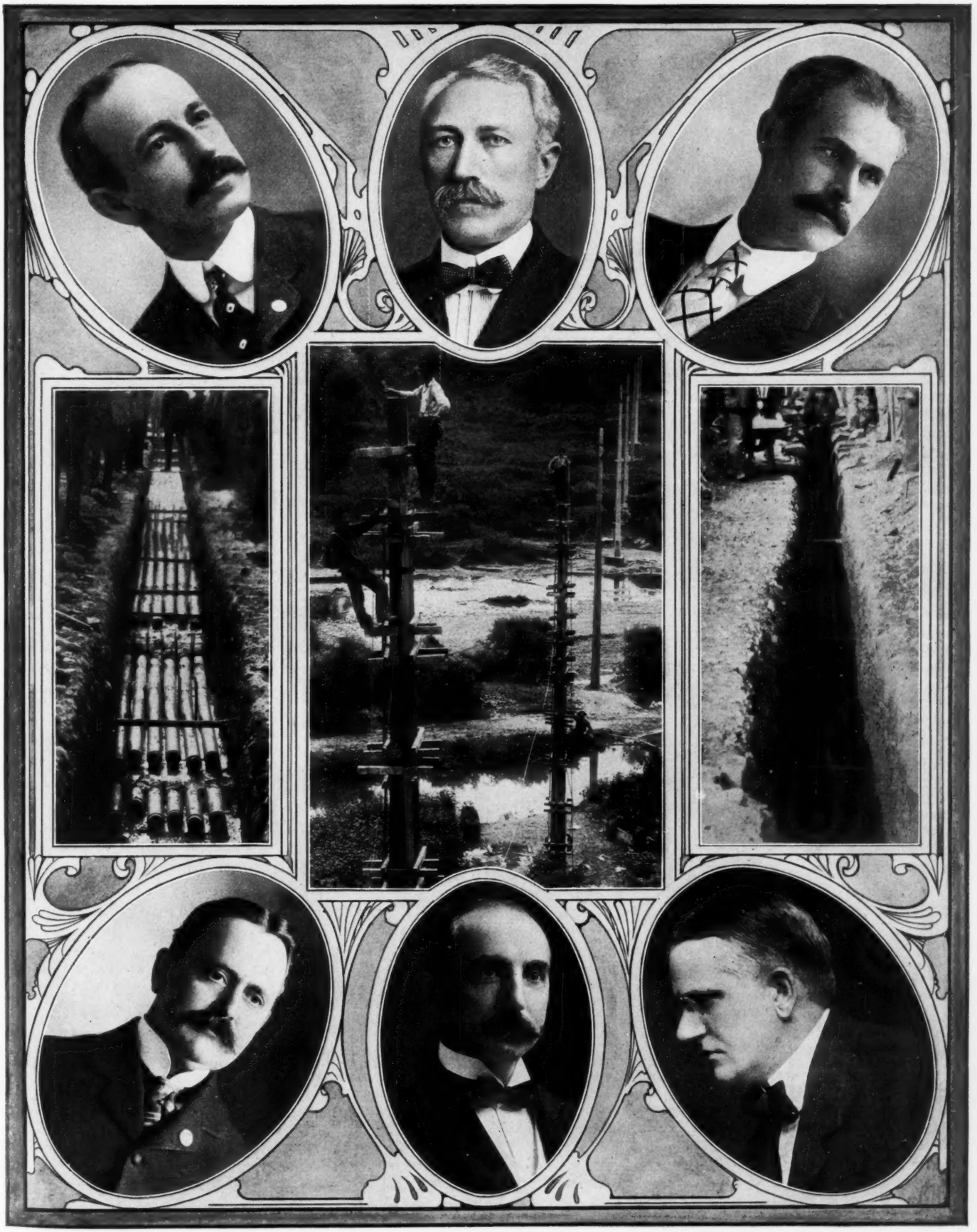
On January 17, 1903, all stock and bonds owned and controlled by Barber & Brailey were transferred to L. M. Flesh, W. P. Orr, and S. K. Statler of Piqua, O.; Edward Cates of Richmond, Indiana, and their associates. Some of these gentlemen being active in the independent telephone field and owning large interests in other companies, at the next annual meeting Messrs. Flesh, Orr and Cates were elected directors of the company. At the annual meeting in 1906 William M. Bailey was elected director, and on September 27 at a special meeting Perry J. Freeman, who had resigned his position as director several years before, was re-elected to fill the vacancy occurring by the death of J. W. Moore, and Leroy E. Browne was elected secretary. The present officers of the company are: A. C. Lindemuth, president; Edward H. Cates, vice-president; J. M. Lontz, treasurer; L. E. Browne, secretary, and W. M. Bailey, manager. L. M. Flesh, Colonel W. P. Orr, A. C. Lindemuth, Edward Cates, J. M. Lontz, P. J. Freeman and W. M. Bailey comprise the directorate.

October 26, 1907, the exchange was cut over from the magneto system to the automatic central-energy system, with several notable features new in the automatic field. One is that when the plant is in full operation there is no machinery running, the batteries being charged with arc rectifiers furnished by the General Electric Company, and all ringing being done with harmonic converters. While motors and generators for charging and ringing are installed, they are used only in emergencies. Another innovation is that all automatic subscribers call country lines direct from the automatic telephones without the aid of operators. An interesting feature is the installation by the company of three sub-stations containing 500 lines. The equipment is housed in a beautiful and absolutely fireproof central office, modern in every way, built this year by the company.



Modern fire proof building of the Richmond Home Telephone Company.

June 19, 1906, the city council, again under suspension of the rules, passed a general ordinance granting to telephone companies, whenever they did a specific amount of rebuilding and reconstructing and under special provisions, the right to charge eighteen dollars per year for residence and thirty-six dollars per year for business telephones, also allowing a



L. E. Browne. secretary. | A. C. Lindemuth, president. | Wm. M. Bailey, manager.
Twenty-four duct lead. | Sixty foot concrete poles. | Underground construction.
P. J. Freeman. | J. M. Lontz, treasurer. | Edward Cates, director.

Officers and Directors Richmond Home Telephone Company and construction views.

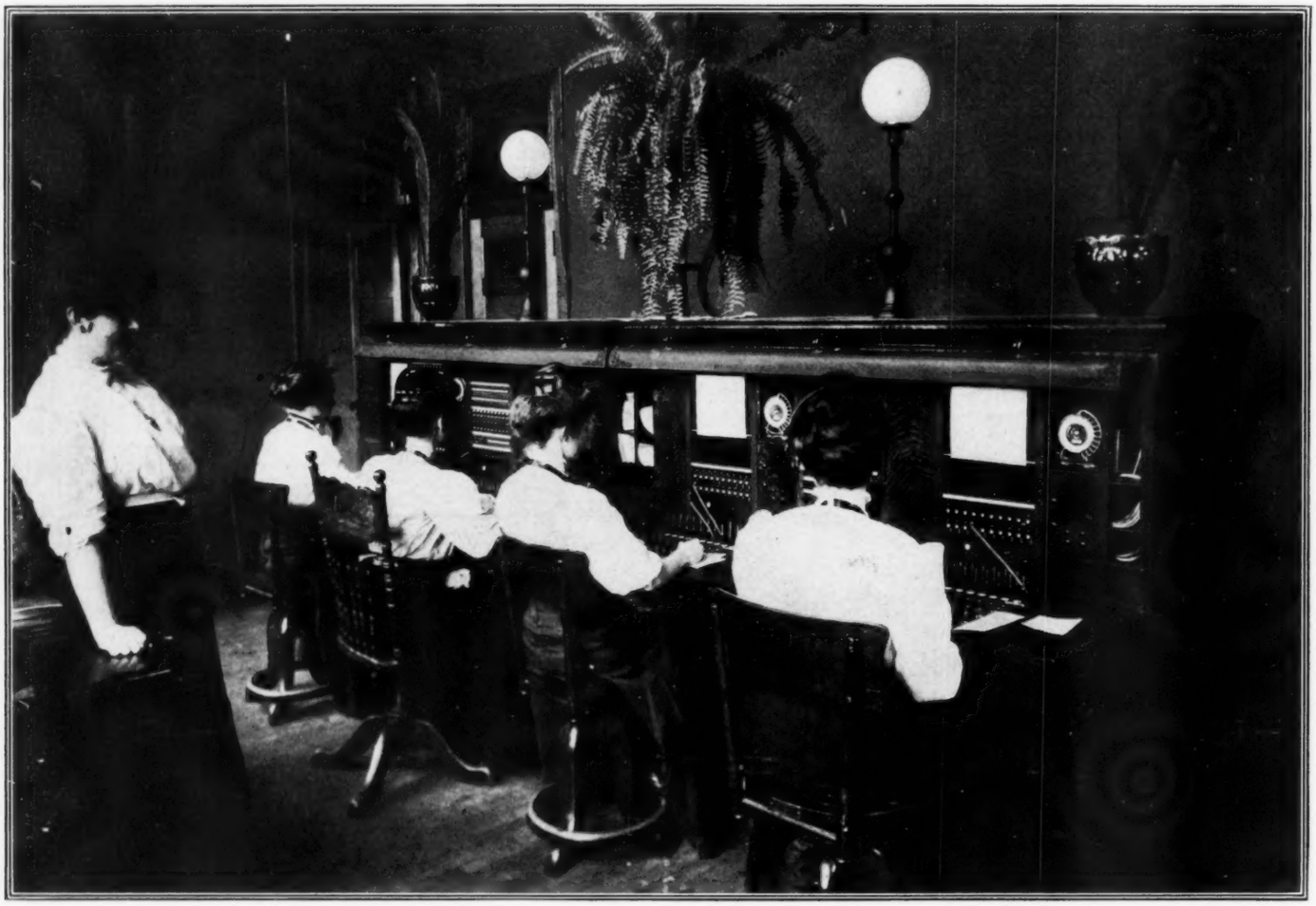
sliding scale of three dollars additional per year per telephone for each additional thousand telephones over and above 2,000. This allowed the Independent company to raise its rates from fifteen dollars and thirty dollars to eighteen dollars and thirty-six dollars per annum.

William M. Bailey, manager, predicts that he will have 3,000 telephones in operation within eighteen months from January 1, which will show a magnificent percentage for a city of 20,000.

The underground system installed in Richmond is more extensive than in any other city of its size in the middle west, the territory embraced being sixteen and one-half blocks long by five and one-half blocks wide. Bituminous fiber conduit of the American Conduit Company's manufacture was used. This was laid in solid beds of concrete from one manhole to another. These manholes are built entirely of concrete, the top being a solid concrete slab through which a hole is left to receive the ring and cover. There are fifty of these manholes distributed at intersections of streets and alleys. There are now twenty-three miles of underground duct laid in which there are more than nine miles of cable, varying from 100 to 300 pairs; all conductors being of number 20 double wrap .10 Roebling cable, distributed from sixty distributing poles.

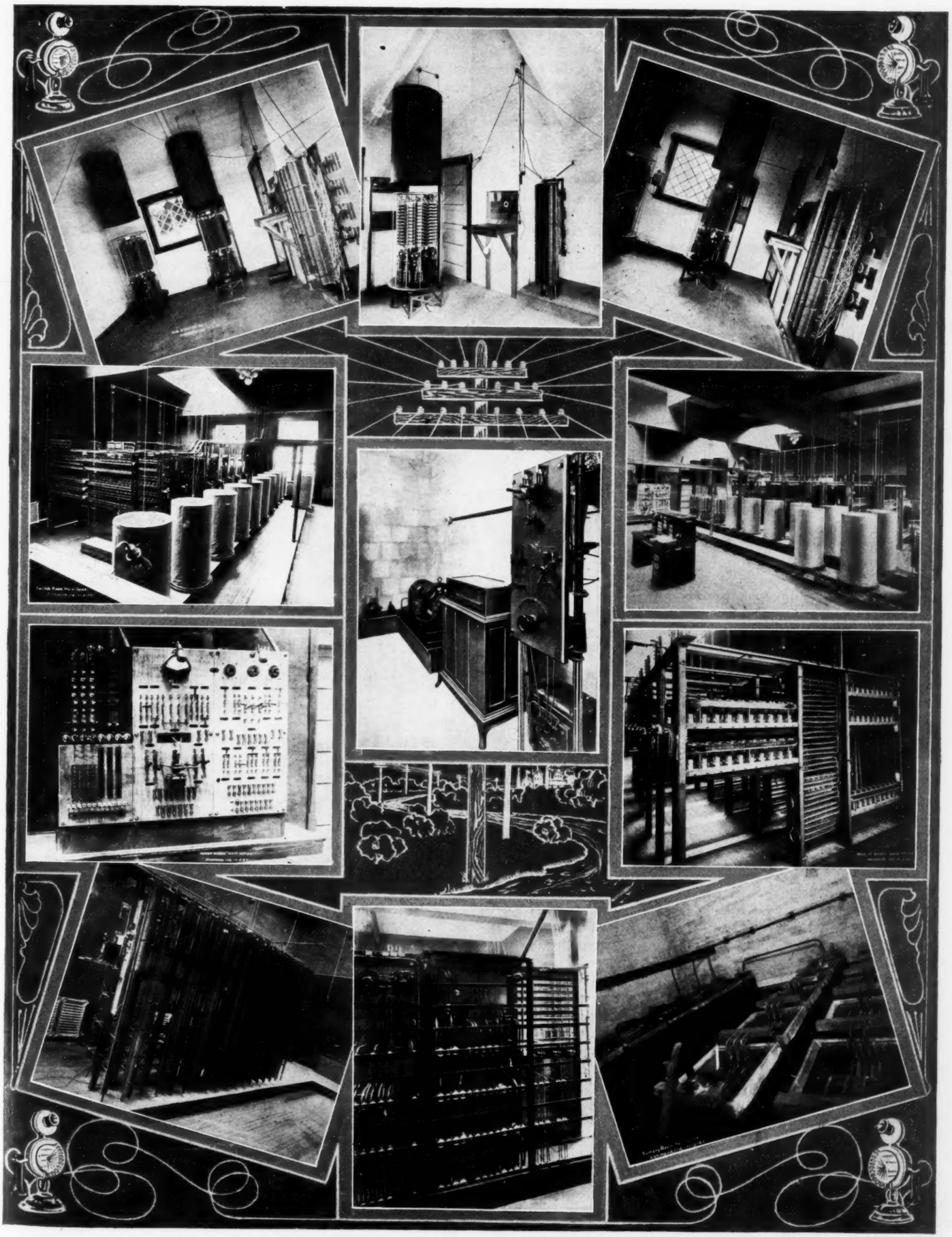
Every foot of aerial cable in use under the old system has been taken down, tested, and restrung in outlying territory, taking the place of old open wires; thus not only eliminating inductive interference from electric light, street railway and other high tension wires, but also troubles from sleet, snow, rain, trees, and accidents common to open line wires. Of this aerial cable reconstruction there are about thirty miles. The main cable, wire and pole leads have been, or will be, removed from the principal streets of the city. The purpose of all this expensive underground and aerial reconstruction was to remove the heavy leads of wires from the streets on account of their danger and unsightliness, and to place the company in a position to render a more perfect and satisfactory service.

The Richmond Home Telephone Company's new home is unique in its architecture and is characteristic of the purpose for which it was intended. Its impressive feature is that of solidity and permanence. The lower floor, which is used for the offices, indicates its purpose at a glance. The upper floor, wherein is located the exchange and mechanical equipment, with its high story, massive windows of small plate glass, and other plain but solid features, manifests plainly its mechanical purpose. The architect in designing the building has happily succeeded in making it symbolical of its uses.



Toll and farm line switchboard of the Richmond Home Telephone Company.

The building is of thoroughly fireproof construction, built entirely of brick, tile, and concrete, the floors and roof being solid concrete and the stairs of slate. Windows and skylights in the automatic room, where the equipment is housed, are of fireproof glass with metal frames which automatically close when exposed to heat. On the lower floor are the main office, the lobby, the public toll room, the directors' room, the manager's office, the telephone storage room, the work room, and the line foreman's room. All of the underground cables in the city are concentrated at Ninth street and come to the building through a large tunnel, passing up to the automatic room on the second floor through an open fireproof shaft, accessible by means of roller iron shutters. In the upper story the front rooms are used for the long-distance and farm-line boards and a rest room for the



Automatic, power and protective apparatus installed, Richmond Home Telephone Company.

toll operators; the balance of the floor being devoted to the large automatic room and the battery and power rooms. The roof of the building is of solid concrete, with an expanse of thirty-eight feet, self-supporting, with four-foot concrete beams. There are very few spans of concrete of equal width in the country. Many foreign telephone experts have examined the building, and pronounce it a most complete, perfect, and fireproof telephone exchange building.

The second floor is so divided that a room forty-six by thirty-six feet at the back of the building is set aside for the housing of the automatic switchboards and terminal rack. This room is large enough to hold equipment for 4,000 lines. Apparatus for 1,300 individual lines and 200 two-party lines is now installed. Each 100 individual lines is represented by a cylindrical unit about five feet high and a little over two feet in diameter. On each of these units is mounted the individual line switch of each subscriber served by it; and about the base of the unit are mounted ten connector switches, which complete all calls made to the lines served by this particular unit. Each of these units is provided with a light waterproof, flameproof and dust-proof cover of Pantasote, which ordinarily completely envelopes it, but which may be readily raised by the attendant, exposing the unit to view and allowing inspection of the working parts to be made. Connections between these units are made by means of other machines, called first and second selectors, which are mounted on parallel racks adjoining the line switch units.

All wires connecting to the switchboard are run to the large terminal rack which stands in one corner of the room, and are there soldered to terminal clips in regular order and numbered, the number of each case corresponding to the number of the machine to which the pair of wires is connected. All wires from the subscribers' telephone instruments are brought through underground cables in the basement of the building and thence to the other side of this same terminal rack, where they also are soldered to terminal clips in regular order and numbered. It is a simple matter for the attendants to cross connect any desired cable pair to any desired machine by means of jumper wires on this rack. The rack, together with the entire cable plant and the remaining outdoor construction, is constantly under the eye and supervision of the wire chief, who sits near the rack at a desk equipped with elaborate apparatus for testing various lines for possible troubles, and for making investigations to locate the exact cause of complaints received from subscribers. A subscriber who wishes to make a complaint in regard to his service may do so by rotating his dial from finger-hole 8 and pushing the button. By this means he is automatically connected to the trouble operator, who makes a record of the subscriber's complaint and asks a few simple questions such as may be necessary to diagnose the cause of the complaint. This information is then turned over to the wire chief, who makes any tests that may be necessary to determine the exact nature of the difficulty and then immediately issues the proper order to remedy it. A subscriber who wishes for information concerning numbers which do not appear in the directory, may secure same by calling the information operator. This operator is reached by pulling the dial from finger-hole 9. She is seated at a desk in the toll room and has a general supervision of the operators in that room, and also supplies the information desired by the subscribers about toll service, rates, etc.

The power for operating the automatic machines is furnished by two large storage batteries situated in the room immediately adjoining the automatic switchboard room. These batteries are recharged when necessary by using either a mercury arc rectifier designed to operate on the commercial power circuit or by using a motor generator outfit designed to run from the same power circuit. All parts of the power plant are in duplicate. Either battery, either charging machine or either ringing machine is capable of taking care of the entire plant, and in case of accident the duplicate battery or machine will be instantly available for use. In this, it will be seen that the Richmond Home Telephone Company has taken every precaution to furnish its patrons uninterrupted service.

The toll and farmer switchboard and the rest room of the operators adjoin each other and occupy the entire front of the second floor of the building. Any subscriber who wishes a long-distance connection secures the long-distance operator by rotating his dial from the finger-hole marked "Long Distance." This operator takes his order and tells the subscriber to hang up his receiver and that when the party desired by him has been secured he will be called. The operator then takes the necessary steps to secure the desired long-distance connection and to get the party who is wanted in the distant city to the telephone. When this has been accomplished she quickly calls the local subscriber who requested the connection, by means of the calling device mounted in the toll board, and puts the two subscribers into conversation with each other. By means of a little signal lamp which glows intermittently in front of the operator she is told automatically when the local party answers his telephone, also when the two subscribers complete their conversation and hang up their receivers.

Rural line subscribers are served by another operator at this same switchboard. When she receives a signal indicating that a rural line subscriber wishes a connection, she answers this call and finds out the automatic number which he wishes, then by means of a regular automatic telephone calling device mounted in the switchboard, she calls the local subscriber desired and puts the two parties into connection with each other. She is also informed by means of small signal lamps when the called party answers and when the two subscribers complete their conversation and hang up their receivers.

City subscribers desiring connection to rural lines do not need the service of the operator. Each rural line has a number which appears in the telephone directory opposite the name of the subscriber connected to the line, just as if this subscriber were located in the city and had regular automatic telephone, and the city subscriber by calling this number and ringing in the regular way secures the rural party. As most rural lines have two or more subscribers connected to them, it is necessary not only to call the required number but also to ring on the line in such a manner that only the desired party will answer. This is made possible by what is called "code ringing"; that is, when the first party, for example, is desired, one short ring repeated at intervals should be given; if the second party is desired, two short rings repeated at intervals should be given, etc. When code ringing is to be used, it is indicated in the telephone directory by printing just after the subscriber's number a letter which shows the number of rings that should be given in calling that particular telephone. While this arrangement may appear complicated it is really very simple and enables city subscribers to secure rural connections almost as easily and quickly as they can call each other.

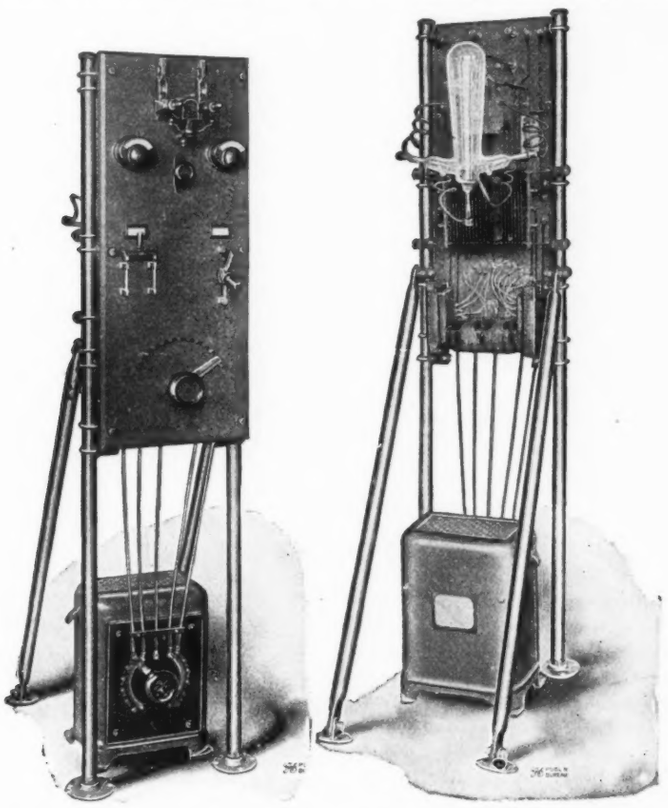
The three fireproof sub-stations have been erected, also built entirely of concrete. These sub-stations have no one in attendance. They are locked up and left to operate automatically, being inspected once or twice per day. One is located in the east end of the city near Nineteenth street, one in the north end at Eighth street and Fort Wayne avenue, and the other in West Richmond. Each one of these sub-stations is furnished with automatic equipments similar to the main exchange and they are designed to accommodate the service in their respective territories, which is trunked into the main exchange by cable and operated exactly the

same as a local call, without delaying service. Each of these stations is capable of taking care of six hundred subscribers. The main building is sufficiently large to accommodate service for five thousand telephones.

The state of Indiana might correctly be called the mother of automatic telephone exchanges, the first automatic exchange ever put into public use being that installed at Laporte about fifteen years ago. The apparatus was, of course, very crude and service was limited to a small number of lines.

A year or two later another automatic system manufactured by the same company was installed at Michigan City. This system was also small and limited in capacity, so that after a few years both Michigan City and Laporte outgrew the automatic switchboards; but the success of the equipment was such that inventors and engineers were inspired to spend years of effort and thought in increasing the capacity of the system and in simplifying and perfecting the mechanism, until to-day the equipment as manufactured by the Automatic Electric Company of Chicago and just put into service by the Richmond Home Telephone Company is claimed to be as nearly perfect as any telephone system that has been devised, and will handle the business of any exchange of whatever capacity.

The last years of the nineteenth century and the opening years of the twentieth century have witnessed wonders in the way of hand labor being supplanted by machinery—and with excellent results, so far as certainty, uniformity and

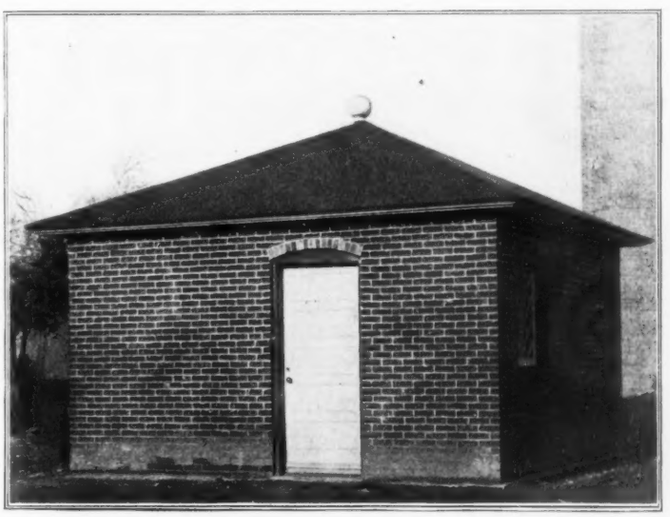


Mercury arc rectifier furnished by General Electric Company for the Richmond system.

rapidity of operation are concerned. The automatic telephone switchboard is a good example of this tendency. To-day this apparatus is thoroughly standardized and is one of the greatest triumphs in the field of automatic machinery. The numerous exchanges now in operation are proof of the success of this system. While the one at Richmond is at present the largest in the state of Indiana, many of the switchboards installed by Independent telephone companies in cities the size of Richmond or larger during the past few years have been of the automatic type. For instance, during the present year large systems have been installed in Oakland, California; Portland, Oregon; Tacoma, Washington; Butte, Montana; Omaha, Nebraska; Akron, Ohio, and numerous smaller places. In the immediate neighborhood of Richmond large plants may be found at Dayton and Columbus, Ohio, and smaller ones at Rushville, Indiana, St. Marys and Van Wert, Ohio.

The advantages claimed for the system from the subscriber's point of view may be summed up as follows:

There are no operators and all the apparatus is taken



Sub-exchange building.

care of by a few expert men who at any time can be readily replaced by experts sent out by the manufacturing company; consequently, the danger of interruption in service is very small.

The service which the automatic gives is absolutely secret, each subscriber having a private wire over which to transmit his communication. This advantage cannot be overestimated by the banker, broker, physician and the general business man, not to mention the fellow who has "a best girl" at the other end of the wire.

In the automatic system a subscriber instantaneously connects with the person he wishes to call and the apparatus is so constructed that it is an impossibility for another subscriber to "cut in" upon, or in any way interfere with the line in use.

The automatic switches never make errors, never gossip, are never tired or sleepy, are not interested in the subscriber's affairs and are never impudent.

The automatic switch is thoroughly cosmopolitan in its nature. No interpreter is needed by a foreigner securing a connection. Anyone can readily get the person desired by rotating the desired numbers on the dial.

The ringing of the called subscriber is entirely under the control of the calling subscriber. He can hold a line and ring as long and as persistently as he wishes.

Quick connections night or day, instantaneous disconnections, the accuracy and promptness with which the busy signal is always given when the desired party is busy, and the fact that it cannot give it when the desired party is not busy, are further interesting features of the system.

The government of Switzerland operates all the telephone service in that country. A universal rate of $12.45 a year is charged, with an additional charge of one cent per local call.

TELEPHONE MERGERS ILLEGAL

An Address Made Before the West Virginia and Indiana Independent Telephone Conventions.

By A. C. Lindemuth

THE history of the telephone reads like a romance. The origin of the telephone, the circumstances of its invention and conflict of the patents; the organization and power of the great Bell telephone monopoly which for seventeen years, entrenched behind and protected by its patents, farmed out the telephone business of the United States to numerous subservient companies and planted its powerful influence into the judicial, executive and legislative departments of the states and the federal government; the splendid legal battles waged by the National Independent Telephone Association against the attempted fraudulent extension of the patents and the further perpetuation of the monopoly and the signal victory of the people; the heroic efforts and generous contributions of those engaged in that struggle; the birth of the Independent telephone movement and the highway methods of the old monopoly to throttle and destroy its first attempt, after lawing and harrassing those so presumptious as to engage in building and operating telephone exchanges—by burning and destroying their telephones and equipment; the wonderful growth of the Independent telephone movement and the marvelous multiplication of telephones under the stimulus of free and popular competition; the springing up of numerous Independent telephone factories, supply houses and accessory concerns to meet the demands of this new and popular system; the scientific perfection of telephonic apparatus under competitive influence and the great diversification and extension of its use; the wasting of millions of its stockholders' money by the Bell company in its unsuccessful efforts to rule or ruin the Independents; the present supremacy of the Independent telephone system, and the splendid assistance rendered by a small coterie of stanch and able telephone journals to that end. These are but the leading chapters in the story of the telephone—partially told by many, but completely told by none.

Interesting as the story is, I must leave it. I regret my inability to take the time to go more fully into the history of telephonic development, for, absorbing as it may be to the student and historian, it is always necessary to a clear understanding of the Independent telephone movement; how and why it came about; its present condition and its future possibilities. By the light of that history, too, we are better able to analyze and determine what the present attitude of the Independent telephone movement is and what its future policy should be.

AN OLD PROBLEM UNDER A NEW FORM.

One of the problems which perhaps is occupying our attention more than any other, is the changed attitude of the Bell Telephone Company and its subsidiary companies in their efforts to better their own condition and at the same time break down the Independent system of the country, by combining, merging and otherwise making physical connection with Independent companies. The remarkable fact about this arrangement is that in every instance where physical connection is made with the Bell company by an Independent company, the Independent company is joined to the Bell system and the Bell company never joined to the Independent system. Such connection is always so regarded by the general public and by the Bell company itself. That I speak the truth with respect to the Bell company is shown by the last annual report of the president of the American Telephone and Telegraph Company to his stockholders issued a few months ago. On page 32 all telephones of Independent exchanges are added to the Bell system. He says: "Including all companies connected with the Bell system, the number of stations is 3,839,000 against 3,000,660 at January 1, 1907, an increase of 768,340 stations." On page 3, he says: "The number of stations at the end of the year operated directly by the associated companies which constitute our system in the United States was 3,035,533, an increase of 308,244. In addition to this number there were 755,316 exchange and toll stations connected to *our system* by our toll and long distance lines." If it were not for these Independent connections there would have been an actual falling off in the increase of Bell subscribers' telephones in the United States over the previous year as admitted by the president himself on page 4 he says: "The increase in the number of subscriber stations operated directly by one associated companies was *less* than last year, due to more rigid collection of bills and more careful scrutiny of applicants."

Again the president of the Central Union Telephone Company in his recent annual report to his stockholders, on page 4 and 5 has added the telephones of all Independent exchanges connected with the A. T. & T. lines in Ohio, Indiana, and Illinois to the Central Union or Bell system. On pages 7 and 8 he further says: "We must continue our liberal policy toward the Independent sublicensees and recognize at competitive points that a property exists on the Independent side which we must reckon with ultimately (that is the Bell must prepare to buy). We should continue our endeavor to consolidate and unify the exchange systems whenever it can be done upon a basis of true values, i. e., actual investment —*until the field is clear.*" By language and inference all the way through both of said reports, such connections by Independents with the Bell Company, however made, are treated as Bell acquisitions. And we all know wherever such a connection is made it is heralded all over the country by the Bell press bureau as another Independent company joining the Bell ranks.

This is significant. It indicates too plainly to be misunderstood the motive behind the movement. That it is the aim and purpose of the Bell company to absorb the Independent system and to again get control of the telephone business of the country. Whether it shall do so or not, rests wholly with the Independents and not with the Bell. It is the opinion of all the ablest Independent telephone men and important Independent telephone interests of the country that such a combination would be subversive to the best interests of the Independent telephone companies and not for the public good and should be prevented.

ILLEGAL WARFARE OF THE BELL COMPANY.

The Bell Telephone Company, after having waged a relentless warfare against the Independents for many years in the operating field, by free and unfair competition, by a most vicious literary bureau, and by other unscrupulous methods originated and practiced only by that company, and finding its opposition along those lines unsuccessful, then sought to starve out or cripple the Independent exchanges by buying up the Independent telephone manufactories of the country. In pursuance of this policy the Bell

company attempted to purchase the controlling stock of the Stromberg-Carlson Telephone Manufacturing Company of Rochester, New York, and of the Kellogg Switchboard & Supply Company of Chicago, Illinois, two of the larger opposition manufacturing concerns. The first attempt involved not only the Stromberg-Carlson company, but also the controlling interest in the United States Independent Telephone Company of New York state, embracing Rochester, Syracuse and other important Independent exchanges in western New York.

Its purpose was completely thwarted by the prompt action of the attorney-general of New York through efforts in the name of the International Independent Telephone Association. This attempted purchase was clearly in violation of the anti-trust laws of the state of New York as tending to destroy competition and create in the American (Bell) Telephone and Telegraph Company a monopoly in the telephone business and was therefore enjoined by the court. These important properties have thus been retained in the Independent system.

The second attempt, the purchase of the Kellogg Switchboard and Supply Company was, after long and persistent litigation, recently set aside by the court. That the purpose of the Bell company was to starve out competition and regain a monopoly of the telephone business of the United States is shown by the findings of the court as set out in its decree.

After describing the two great telephone systems, local and long distance, of the American (Bell) and Independents, the court says, "and in January, 1902 (date of sale) and for a long time prior thereto, said system of said American company and its licensee companies and said system of said Independent telephone companies constituted two rival organizations which during said time were in sharp competition with each other in the rendering of telephone service, both local and long distance, to the public throughout many parts of the United States."

Continuing the court says: "That each of said attempted purchases . . . by said American company as aforesaid, in its necessary operation, at the time it was made, tended, and tends to materially suppress competition and create in said American company and its said licensee companies a monopoly in the rendering of telephone service to the public throughout the United States and in the different cities and other places thereof and that it was the intention and purpose of said American company in making each of said pretended purchases of said shares of stock to so restrict and suppress competition in said telephone service and create in itself a monopoly of said service."

In every instance thus far, the courts have been quick to recognize the indirect attempt on the part of the Bell company to stifle competition and to create in itself a monopoly and have declared such attempts illegal and void, so that its efforts along this line have now ceased. This move was a bold one because in violation of law, and a foolish one because new factories could have been built to take the place of those purchased. It shows to what extreme measures the Bell company will resort in the vain attempt to obtain the exclusive control of the telephone business of the country.

It will be noticed that in both cases the court held that the attempted purchase of these two large Independent telephone manufacturing plants not only tended to destroy competition and create a monopoly in the telephone manufacturing business but indirectly tended to destroy competition and create a monopoly in the Bell company of telephone service throughout the United States or parts thereof and that said attempted purchases were therefore illegal and void.

Its new and latest plan to regain the telephone situation is equally unlawful and must result in failure. It is to purchase Independent exchanges or to induce Independent telephone companies to merge, consolidate or combine with it or to make physical connection with its wires and systems and to become its sublicensees. All such combinations, mergers and agreements that tend to stifle or destroy competition and to create a monopoly are in violation of law and void and subject those participating therein to punishment. That these combinations, mergers and agreements do stifle or destroy competition and tend to create a monopoly is evidenced by the fact that the very purpose and reason given for such arrangements by its advocates, is, that competition may be removed and a monopoly created; claiming thereby that all duplication and economic waste will be eliminated and the telephone companies will profit thereby. And as an "inducement" to procure Independent telephone companies to enter into such combinations and agreements that company has threatened to introduce competition into cities and towns where no competition exists and offered to remove its competing exchanges in cities and towns where both systems are in operation. Influenced by fear in some instances and by gain in others, a few of such unlawful combinations, mergers and agreements have been entered into with the Bell company by Independent companies, and these instances are boastfully given publicity by even the high officials of that company. That these last efforts will prove equally disastrous to the Bell company, I have no doubt.

UNLAWFUL COMBINATION AND MERGERS.

There is no reason why telephone companies should be permitted to violate the law with impunity any more than railroads, telegraph companies, banks, gas or water companies, paper or tobacco companies, or other corporate organizations, either public or private, should be allowed to do so. The law should be no respecter of persons or interests, and it matters not whether the company is an Independent telephone company or a Bell telephone company, its duty to observe the law should be equally required and if violated the punishment should be impartially inflicted.

As a foreign policy, we as a nation are in favor of the open market; as an internal or domestic policy we are opposed to monopoly and in favor of fair and unrestricted trade. The principles of this policy so universally demanded by the people have been embodied in an act of Congress entitled "An act to protect trade and commerce against unlawful restraints and monopolies," passed and approved July 2, 1890, and commonly known as the "Sherman Act." This law was successfully applied in the Northern Securities case, dissolving one of the greatest and most skillfully devised trusts in the country, and is now being invoked against the oppressive paper trust. This act makes unlawful "every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several states, or territories, of the Union and makes criminally liable "every person who shall monopolize, or attempt to monopolize, or combine, or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several states, or foreign nations," and prescribes as punishment a fine not exceeding five thousand dollars or imprisonment not exceeding one year, or by both fine or imprisonment in the discretion of the court.

In addition to this federal statute, in nineteen of the states anti-trust laws exist in my opinion sufficiently broad to cover unlawful combinations, mergers, or agreements between telephone companies tending to create monopolies and destroy fair and legitimate competition between them; and in all the other states the common law makes all such combinations, mergers and agreements illegal as in restraint of trade and contrary to public policy.

In the face of these laws it is a remarkable fact that one of the great telephone systems of the country is openly advocating the combination and merger of Independent and Bell telephone interests of the country, the destruction of competition and the creation of a monopoly in the telephone business, and its officers and employes are active through-

out the country in counseling, advising and conspiring to bring this about. A few of these illegal contracts and combinations have already been consummated with certain Independent telephone companies, which contracts and mergers are liable under the law to be dissolved and those participating in bringing them about are liable to criminal prosecution, and that, too, without respect to whether they represented Bell or Independent interests.

It has been recommended to the important Independent telephone interests of the country that a fund of at least fifty thousand dollars be raised to be used in seeing that the laws of the country are obeyed by those telephone companies which are disposed to violate these anti-trust laws and that those already guilty be dealt with as the law provides. This recommendation has been heartily approved. Over twenty thousand dollars of the fund has already been subscribed and I have no doubt but that the entire amount will be oversubscribed within a short time. It should be the duty of the federal and state authorities to see that unlawful mergers and conspiracies among telephone companies are dealt with as such violations of the law are treated with respect to other interests and steps will no doubt be taken at an early day to see that these matters are fully and forcibly called to their attention.

All approaches or conspiracies on the part of our common competitor looking towards the formation of unlawful mergers, combinations or agreements, should receive no recognition whatever by the Independent telephone companies because if consummated they would be destructive of competition and be detrimental to the best interests of the general public and the Independent companies themselves and are in plain violation of law.

Information has also been received by the International association that some of the concerns dealing in telephone supplies and equipment have formed and for some time have maintained an unlawful combination for the purpose of preventing competition and maintaining prices in such supplies which lay such firms and companies and those concerned therein liable to the same laws above referred to and these violations should be treated with equal impartiality with those participated in by operating companies.

It is anticipated that the International association will soon take upon itself the responsibility of looking after the enforcement of these wholesome laws and in that duty the association solicits the faithful co-operation of all citizens.

COMPETITION.

Competition in the telephone business is bound to exist in some form or other, unless the business should be taken under the absolute ownership or control of the government or municipalities, and of this there is little or no probability under modern laws and conditions. So long as monopolies are abhored and every man rightfully free to engage in any lawful enterprise, it is reasonable to expect that there will always be men and capital ready to enter the telephone field as they would any other business where no competition exists. Government or municipal regulation may regulate, but it can neither lawfully prohibit or destroy competition.

This being true it is my opinion that the Independent companies can best subserve their own interests and the public good by accepting the present known competition and by continuing to meet it fairly in the field. The conditions of competition have been and now are those of a monopolistic and foreign company as against a system of Independent local companies organized, officered, financed and managed by the people of their respective communities. The Independents have nothing to fear from such competition and having had the loyal support and approval of the public in the past, they may rightfully expect it in the future. When the Independents entered the telephone field in competition with the Bell company, secured their franchises, obtained the patronage of the people and connected up with other Independent companies, they assumed a trust towards the general public and their co-Independent companies which they have no moral right now to abandon or barter away. And this obligation is by no means one sided. The general public in return have not only a direct interest, but a moral responsibility to sustain the Independents in maintaining the benefits of legitimate competition.

A GREATER INDEPENDENT SYSTEM.

I am of the opinion that the Independent telephone companies of the country fail to comprehend the importance of their own position and the relative value of their respective properties. Many rights and by-products which now lie dormant and yield no return whatever, only await a constructive hand to arouse them to activity and organize them into a dividend bearing asset. The time has now come when instead of considering the forming of unlawful alliances with an unprofitable competitor, the Independent telephone companies should improve the financial and physical condition of their properties and assist in the more complete organization and perfection of a great Independent telephone system. There is a growing need for this, for the work ahead is such that which no other existing telephone system is so well fitted to accomplish and no individual company adequately equipped to finance. Past experience has proven that it is impossible for any one company organized upon lines other than a popular system such as the Independent to develop the undeveloped field and at the same time take care of the wonderfully increased popular use of the telephone as well as the natural increased demand incident to a rapidly growing population.

When we take into consideration the wonderful increase in the number of telephones in the last ten years; the amount of undeveloped territory; the cities and towns and rural communities wherein telephone competition does not yet exist; the rapidly increasing popularity of, and multiplication of opportunities for the use of the telephone; the great undeveloped telegraphic facilities in connection with the long distance toll lines, and at the same time bear in mind that the average yearly increase in population in the United States is in excess of one and a quarter millions, the necessity for more extensive organization, equipment and activity must be apparent to all.

It is a remarkable fact, too, that all this increased business, which has taxed the Independent companies to their utmost capacity to accommodate, has come practically without solicitation or expenditure of money to obtain. While almost every other business under the sun spends a large part of its earnings in soliciting new business and resorts to all sorts of advertising schemes to attract new customers, no Independent telephone company is compelled to maintain solicitors in the field or spend any portion of its earnings to get all the business it can properly take care of. This is but one of a number of splendid features which should attract capital to the telephone business and interest investors in the securities of telephone companies.

THE TELEPHONE BUSINESS UNAFFECTED BY THE PANIC.

The past year has been an eventful one for the business of the country. We have just passed through, or rather are passing through a financial panic and business depression such as has not been felt in many years. It has been more severe and wide spread than most men have been willing to acknowledge, and has affected the industrial, mercantile, commercial and financial interests and practically all other branches of national trade—many seriously and some disastrously. Some banks and trust companies have closed their doors. Many factories have been running on short time or have shut down altogether. It is said that a half million of empty freight cars have been lying idle on the railroad sidings of the country. Many concerns whose solvency and credit are beyond question, have found it difficult to obtain sufficient funds to meet their pay roll and

impossible to borrow new capital even upon gilt-edged securities.

It was the first experience of the Independent telephone system with a panic. The last great panic was in 1893. What its effect would be was, of course, problematical. What effect it has had is now known. Nothing in the history of the Independent telephone system has been more remarkable than its record during the panic. A new and complete listing of the Independent telephone companies of the country show over ten thousand, and if there has been any failure among these during the year, it has not been reported to or come to the knowledge of the officers of the International association.

All of the many thousand companies in the United States with but very rare exceptions have met their interest and other fixed charges promptly and shown a substantial earning during the year. Every company of which I have inquired, and I have taken occasion to ask of many in my travels over the country since January, has shown an increase both in collections and business in practically every month covering the panic over the corresponding months of 1906 and 1907.

In Central Union territory, being the states of Ohio, Indiana and Illinois, of the thousand and more companies organized and operating upon a commercial basis—that is not mutual—all with but few exceptions, where rates have not been too low, have paid from four to twelve per cent dividends on their capital stock or its equivalent in interest and dividends when bonded, not only during the panic, but practically since their organization. What a contrast to this is the annual report of the president of the Central Union Telephone Company recently made to his stockholders wherein he says that: "The Central Union Telephone Company has not been making returns on the investment for the past twelve years." This, however, has not been due to the panic, but as shown by the report to free service, the competition of the Independents, the Central Union's excessive bonded indebtedness, high operating expenses and extravagant management.

The Independent companies have it is seen been practically unaffected by the financial and business depression, due no doubt largely to the facts that telephone rentals are small in amount, payable in cash in advance, and the telephone being a household and business necessity, no one could afford to dispense with it. These facts and this remarkable showing during the recent panic has attracted the attention of bankers and investors and given the Independent Telephone companies a higher standing and credit in business circles.

There has been a decided advance in the Independent telephone system in the country during the past year, both in physical property and earning capacity. Many of the companies have rebuilt or greatly enlarged their plants, and all have more or less improved their service and management. Many of the companies, too, have secured an increase of rates during the year, thus increasing their income and placing their properties upon a firmer financial basis. All companies should do this where the growth of their system has out-grown their rates. No one should be timid in this regard, because no one could foretell the phenomenal growth of the Independent telephone system under popular and extensive service, and it is equally for the benefit of the people that Independent competition be maintained upon a healthy basis.

THE MICHIGAN MANAGERS' CONVENTION.

THE Michigan Independent Telephone Managers' Association met at Ionia, May 14 and 15, with an attendance of well over a hundred managers and toll and chief operators. An address of welcome by Hon. George P. Winchell, mayor of Ionia, was responded to by William Robinson of Muskegon, president of the association.

A paper on the Use and Value of Toll Maps, in which the subject of saving canceled calls was considered, was read by Miss Fannie Hiddie, chief operator at Grand Rapids.

A paper on "Suggestions as to the Best Method of Handling Through Business," by Miss Katheryn Simmons, toll operator, was discussed with great interest, F. N. Newman pointing out the importance of the subject. Many suggestions were offered, the Traffic Association inviting a special committee of three to join it in a further investigation of the subject at Grand Rapids this month.

A paper on "The Check Ledger" was presented by Miss Julia Lawless, record clerk of Grand Rapids. Miss Lawless' method of using the ledger was discussed with interest.

A paper on "The Duty of Members and Delegates to the Convention," by M. A. Porter, of the Northville Telegraph Company, was read by C. E. Smith, Mr. Porter being in the throes of a conflict with the opposition and unable to attend.

Some of the papers read the following day were "Uniform Courtesies to Long Distance Patrons," by Miss Bessie Bottomley, chief operator at Cadillac; "Criticisms by a Long Distance Patron," by C. D. Boyd, of Cleveland; "The Value of Peg Counts," by Edmund Land, of Detroit; "Discipline," by Mrs. F. F. Ferrient, chief operator at Jackson, and "Handling Unfinished Toll Tickets," by C. A. Bloss, of St. Johns.

The president of the association, Hon. E. B. Fisher, spoke of the value of the meetings, calling attention to the steady upward tendency of the telephone business during the recent financial stress.

An interesting speaker was C. F. Schneider, chief of the Government Weather Bureau at Grand Rapids. Mr. Schneider urged that attention be given to the correct transmission of weather reports, stating that the bureau placed more dependence on the telephone than on the mails.

Considerable discussion arose as to the use of the word "please" by operators. One manager said his exchange has 1,200 calls a day which would require 2,400 pleases a day. He thought a girl could say please 2,400 times and not consume over 12 minutes' extra time, but the operators did not enthuse. Most of them thought that simply "number" asked with a rising inflection of the voice ought to please almost any patron.

In the evening of the first day the ladies of the Baptist Church served a banquet, at which C. E. Tarte, of Grand Rapids, presided as toastmaster. This was followed by a dance.

The large number of valuable suggestions made during the course of the convention caused the managers to declare the association a powerful factor in the betterment of telephone service. Eight new members were admitted to the association during the convention.

TELEPHONE CALLS IN LENT.

MANY of the social and card clubs have discontinued their meetings during the Lenten season, but as a result the telephones are obliged to do extra service and the members of the family at home obliged to do penance by listening to prolonged conversation which does not interest them, says the Columbus (Ohio) Dispatch. When Wednesday afternoon or Thursday afternoon comes the girls feel that they must hear from every member of the club, as has been their custom in former weeks. First Agnes calls up Mabel and the line is busy; then she calls up Ethel and this line, too, is busy; then Central is asked to ring Evelyn's number, and when Evelyn is reached Agnes tells her what a time she has had trying to get the girls. Evelyn has had the same difficulty, but finally did reach a few. The entire afternoon is spent visiting over the telephone, and as a consequence the mothers think that it would be just as well not to discontinue the social gatherings during the season.

JOINT POLE CONSTRUCTION

Advantages and Ethics in the Use of Common Poles by Electric and Telephone Companies

By Clarence Mayer

THE construction of joint pole lines by telephone and electric companies being comparatively infrequent, and its advantages in many cases unknown, it is the purpose of this article to point out from a telephone company's point of view some of the benefits that may be derived from joint work.

Clarence Mayer, formerly cost statistician and facilities engineer, Chicago Telephone Company.

An inspection of pole line construction will show, in most cities and villages, poles on both sides of many streets and alleys; electric light and power wires of high voltage crossing both under and over telephone wires—sometimes within a few inches of each other, and innumerable dangerous and unsightly conditions. Almost every day we hear of a telephone lineman or repairman being killed or injured by coming in contact either directly or through the medium of a telephone wire, with an electric light or power wire. Many times a telephone company is compelled to build a long circuitous route or install conduit to avoid electric light or power lines. There are instances where a telephone company has built lines in new subdivisions in order to secure right of way in advance of the electric company, even though the lines may not be in service.

When it is considered that all these conditions may be avoided by joint pole construction, the cost of which is less for both companies than separate construction, it seems folly to believe that any telephone company would refuse to enter into such an agreement with an electric company when familiar with its advantages.

In almost every city or village the people will object to having two lines of poles on a street, and such conditions often lead the municipalities to pass ordinances or make provisions in renewals of franchises, requiring that the lines be installed underground, although the number of telephones in service does not warrant such expense.

Where electric light or power lines parallel telephone lines, each drop crossing over or under the electric wires creates a dangerous situation unless the drop be five feet under the electric wires at the crossing point.

This is also true of electric light and power wires crossing over telephone wires with a clearance of less than five feet, or crossing under, no matter what the clearance may be.

Dangerous conditions are also created at points where telephone and electric light or power lines cross, and these points are numerous in almost any city or village where a telephone and an electric company maintain separate pole lines. Lack of proper clearance between such wires will, in a large percentage of cases, eventually cause either an accident—usually to linemen or repairmen but sometimes to subscribers—pecuniary loss by blowing out of instruments, interruption of service, repairs or induction troubles. This may be readily perceived when it is considered that if the telephone wire be under the electric light or power wires without proper clearance, the soft wire generally used by electric companies will in the course of time, if slack is not continually pulled, expand enough to come in contact with the telephone wire, especially when subjected to the heat of a mid-summer day or the added weight of sleet or wet snow. If the telephone wires are over the electric light or power wires the situation is worse, on account of the liability to breakage of the small gauge hard drawn copper wire or the galvanized steel wire used by telephone companies, and the danger to telephone workmen when going up through electric light or power lines without knowledge of the voltage carried or time of turning on current, and without properly insulated tools and gloves.

Instances where lines are built when not actually needed, in order to secure right of way in advance of the electric company, are frequent where only one side of a street is clear of trees or where right of way for only one pole line may be secured. Circuitous routes and conduits are built and lines are often abandoned in cases where telephone lines have been overbuilt or underbuilt, where electric light or power lines are on both sides of a street and where conditions cited in the previous paragraph exist.

Joint pole lines, to be an advantage from a construction standpoint, call for the erection of poles of sufficient height to allow proper clearance over the roadway and between the wires of the respective companies as shown in Figures 1 and 2, and also imply proper maintenance of lines as explained in the sample agreement shown later in this article.

Figure 1 shows the style of construction used for joint poles when no transformers are attached. There is a neutral space between the lower buck arm of the electric company and the upper cross arm of the telephone company, which allows a clearance of five feet between their respective wires. The telephone company, however, has the right to invade this space when it requires a buck arm attachment, but the buck arm may not be placed more than twenty inches, center to center, above its upper cross arm.

Figure 2 shows the style of construction used when transformers are to be attached to poles. It will be seen that there is a clearance of six feet eight inches between the upper cross arm of the telephone company and the lowest attachment of the electric company. The object of this additional clearance is to allow sufficient head room under the transformer for convenient and safe working by telephone men and also to avoid induction by transformer leakage.

Both these styles of pole construction take into consideration the comparatively great expansion of electric light and power wires; they allow sufficient clearance between wires to avoid induction trouble, except where a single phase return system is used; they eliminate most of the danger to telephone workmen, and the danger from breakage of telephone wires; and if a proper maintenance clause is inserted in the agreement, requiring the electric company to pull slack in its wires when necessary and keep them in proper condition, only an extraordinary incident

such as the breaking of a pole or an electric light or power wire can cause trouble.

Combination construction frequently prevents ordinances requiring underground installation of wires, and it facilitates the securing of rights of way and reduces their expenses, especially where the municipality owns and operates the electric plant.

COMPARATIVE MATERIAL AND LABOR COSTS OF SETTING POLES.
Based on the use of Swamp or Flooded Ground Michigan Cedar Poles.

Length of Poles	Size of Tops	Circumference of Butts	Weight	Average cost of poles, including freight and unloading	Cost of Steps (@ $0.0253 each	Cost of Paint and Painting	Cost of Shaving	Cost of Setting	Total Cost	One-half Cost
25 Ft.	6 In.		275 Lbs.	$1.90	$ .15	$ .36	$ .31	$1.78	$ 4.50	
30 "	6 "	33 In.	425 "	3.50	.20	.41	.34	2.62	7.07	$3.54
30 "	7 "	36 "	540 "	5.50	.20	.43	.38	2.78	9.29	4.65
35 "	7 "	38 "	720 "	8.10	.25	.48	.46	3.64	12.93	6.47
40 "	7 "	43 "	900 "	9.35	.30	.56	.53	3.91	14.65	7.33

Note—Wages, per day of 8 hours: Groundmen, $2.00; Linemen, $3.00; Combination men, $2.50; Foremen, $3.50. Teams, $5.00.

The table shows the comparative material and labor costs of erecting the different size poles used for standard city and village exchange lines. The costs of materials are based on present prices, and the labor is based on the average cost of setting poles in different kinds of soil.

It will be seen from an examination of this table that if in separate construction twenty-five foot, six inch top poles are used, the use of thirty foot, six inch top poles for joint construction would mean a saving of ninety-six cents per pole, or if thirty foot, seven inch top poles are used for joint construction the increased cost would be small. Where thirty foot, six inch top poles are used for separate construction, as is the general custom with most telephone

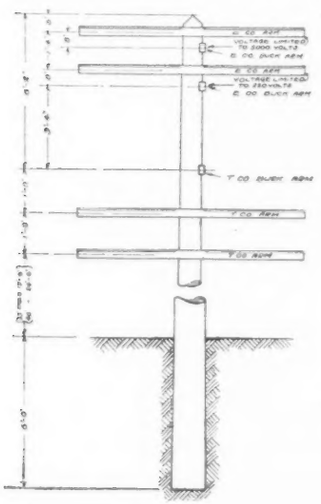


Figure 1.

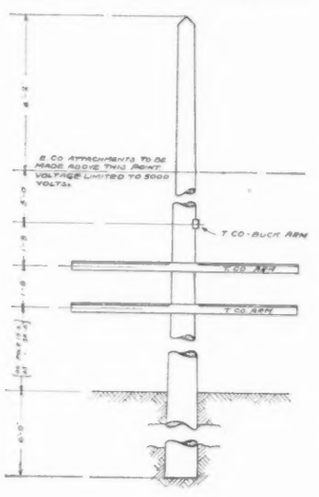


Figure 2.

companies, the use of a thirty-five foot, seven inch top pole for joint construction would mean a saving of sixty cents per pole.

There is also a saving of one-half the cost of the anchors used, and this taken in connection with the saving on poles makes joint pole lines economically advantageous, irrespective of other considerations.

An instance which shows the advantages of joint pole construction occurred in a village where a group of retired farmers formed an electric light and power company and secured a franchise permitting them to set poles and string wire on any street in the village. Two telephone companies operated in the village. The managers of the smaller company, although living in the village and personally acquainted with the owners of the electric company, paid little attention to them, notwithstanding the fact that they set poles in their lead; while the larger company sent a representative from its main office about forty miles away, and entered into a joint pole agreement with the electric company whereby it sold to the latter one-half interest in some poles and allowed them to use certain other poles, without compensation, for span wires attachments. The electric company replaced the poles of the telephone company with higher poles in places where its wires crossed under those of the telephone company and gave them a half-interest in the new poles, the old poles being retained by the electric company. Each company agreed to notify the other company in writing, inviting them to join in the construction of any pole lines to be erected in the future. Every crossing was made according to the telephone company's request for a five foot clearance under the electric light and power wires, except one crossing where the telephone company's poles were fifty feet in height and where on account of tree conditions the equipment and wires could not be lowered; and at this location, the electric company strung guard wires over its lines to keep the telephone wires, in case of breakage, from falling on its wires. The only expense to the telephone company was incurred in lowering its equipment on the poles in which it sold one-half interest, and this expense was more than balanced by the bill to the electric company for such interest.

The electric company also was benefited by the joint agreement as it was able to reach points where the telephone company had lines, without its wires coming in contact with those of the telephone company; it saved the cost of several span wire poles and one-half cost of a large number of poles, all of which more than balanced the extra expense to which it was put.

On the other hand, the small, local telephone company had many circuits grounded by poles set in its leads, and the wires of its main lead were so close to the electric light and power wires that induction made the lines too noisy for service. It could not lower its equipment on account of small poles, and the clearance over the roadway required by the village regulations; and therefore had either to install cable or get out of business. It chose the latter.

The following agreement is in force between a telephone company operating in one of the largest cities and surrounding territory within a radius of fifty miles, and a large electric light and power company operating in the city only. The general form of the agreement is used by the telephone company in arrangements made with electric companies or municipalities in any of the territory in which it operates.

The agreement is shown to point out advantages of joint construction not previously referred to in this article, and as a good example of a joint pole agreement which benefits both parties.

The clauses relating to the payment of the cost of transferring wires and equipment will be of more advantage to telephone companies, on account of the greater equipment and larger number of wires maintained by them. It will be seen that under this agreement each company handles and transfers its own wires and equipment. This is done in order to avoid the mistakes in construction occasioned by workmen handling wires of the other company when not familiar with its methods.

That part of the agreement which requires the company replacing poles of the other company to first purchase one-half interest in the old poles if they have been set less than five years, was inserted in this particular instance by the telephone company, on account of having many more poles than the electric company and receiving more requests to replace than it made.

AGREEMENT BETWEEN THE TELEPHONE COMPANY AND THE ELECTRIC COMPANY.

In accordance with the understandings which we have had from time to time concerning our joint pole work, it is thought advisable

to put in writing the general condition under which we are working for the information of those concerned, to which we have agreed as follows:

First: That each company will notify the other, in writing, of any intention to erect poles in the streets, alleys and on private property in the city of ————, and will invite the other company to purchase a partial ownership in said poles; that the acceptance of the invitation of the company which proposes to do the work be optional with the other company, and in case the invitation is accepted the company doing the work will bill to the other company the latter's proportionate cost of the poles erected at the prices to be agreed upon by them from time to time.

Second: That when it is necessary, to replace a pole owned by "the company" to provide space for the "other company," the "other company" will do so at its own expense after having obtained the permission of "the company." The "other company" will pay "the company" the cost of transferring "the company's" wires and equipment from the old pole to the new pole. The "other company" shall first, through purchase from "the company," secure a one-half interest in the old pole at the usual agreed rate. Thus the old pole shall, when replaced, become the property of the "other company." The ownership of the new pole will thereafter be vested jointly in both companies, with the understanding that should either owner permanently abandon the use of said pole, the owner so abandoning will notify the other owner, in writing, and thereupon said pole will become the property of the other owner without further cost or expense.

Third: That the second paragraph of this agreement shall not apply to thirty foot poles which have been set more than five years. It is agreed instead that if the "other company" wishes to place its equipment on any thirty foot poles of "the company" when said thirty foot poles have been set more than five years, the "other company" will replace the thirty foot poles by poles suitable for the requirements of both companies and that "the company" will transfer its equipment to the new poles at the expense of the "other company." The old poles shall be removed by and become the property of the "other company." The ownership of the new poles will hereafter be vested jointly in both companies, with the understanding that should either owner permanently abandon the use of said poles, the owner so abandoning will notify the other owner, in writing, and thereupon said poles will become the property of the other owner without further cost or expense.

Fourth: That when it is necessary, in order to provide space for the "other company" on a pole which is the property of 'the company" to transfer or alter the position of the wires and other equipment of "the company," the "other company" will pay to "the company" the cost of doing said work, including the cost of restenciling. The "other company" will also purchase from "the company" a partial ownership of said pole at prices to be agreed upon as referred to in the first paragraph of this agreement. Ownership of said pole will thereafter be vested jointly in both companies, with the understanding that should either owner permanently abandon the use of said pole, the owner so abandoning will notify the other owner, in writing, and thereupon said pole will become the property of the other owner without further cost or expense.

Fifth: That the work of maintenance of all poles jointly owned by the two companies shall be done by the company whose initials are placed first in the stenciling on the poles, with the understanding that the other company will bear its proportion (as determined by the ratio of cost at which the particular pole involved was first billed) of the expense so incurred. It is also understood that due written notice will be given to the other company so that it may verify the correctness of the charge. It is understood that this arrangement covers only such work as is necessary to do on the pole due to natural depreciation, the action of the elements or other causes for which neither company is responsible. Replaced poles are further provided for in the sixth paragraph of this agreement. It is further understood that the ———— Electric Company will maintain its wires and equipment on all joint poles in a manner satisfactory to the ———— Telephone Company, and in event of its failure to do so, the ———— Telephone Company may, upon due written notice, have the work done and bill the ———— Electric Company for the cost of such work. It is understood that this arrangement refers to "pulling slack," repairing wires, etc., when necessary.

Sixth: That the future ordinary maintenance expenses on poles which are hereafter replaced shall be distributed on the basis indicated in the fifteenth paragraph of this agreement. Thus, for example, the ———— Electric Company would, in the event of its replacing a ———— Telephone Company thirty-five foot, seven inch top pole with a forty foot, seven inch top joint pole be responsible for four-sevenths of the maintenance expenses (and

Examples of joint pole construction.

said pole will become the property of the other owner without further cost or expense.

the ———— Telephone Company would be responsible for three-sevenths of the ordinary maintenance expenses) on the forty foot, seven inch joint pole.

Seventh: That if the pole jointly owned by the two companies is found to be unsuitable for any reason other than regular maintenance causes for the need of either company, the company interested may replace said pole with a pole of such size as it requires. The owner so replacing a pole will pay to the joint owner the cost of transferring its equipment to the new pole, the old pole becoming the property of the owner doing the work, the ownership of the line remaining unchanged.

Eighth: The ownership of the right of way in any city block shall be vested in the company which first sets a pole in the right of way. It is understood, however, that a single guy stub twenty-five feet or less in height supporting poles not located in the same block will not be considered as establishing a new right of way. It is also understood that in cases where there are two or more separate alleys in a block that each alley will be considered as a separate right of way. Also that a single alley may have jogs or turns in it which will not interfere with its being considered as a single right of way. This general rule will also be understood to apply to poles set on private property. It is further understood that the company owning the right of way will have its initials placed first in the stenciling of the poles and that all the poles in the right of way will be painted the color selected by the company whose initials appear first on the pole, in order to secure uniformity in the color of the poles. It is, in addition, understood that either company may set, for its own individual use, across the alley in any given right of way, a single pole for some special purpose. The preceding sentence is intended to apply to a transformer pole, a lateral pole, a terminal pole, or something of a like nature. This single pole shall be painted and stenciled as per the standard of the particular company that erects same.

Ninth: That in buying an interest in old poles, the particular company which purchases same shall pay for them on the basis now noted: (A) A pole which has been set for more than ten years—one-half of one-half, or one-quarter of the original cost. (B) A pole which has been set for ten years or less—one-half of the original cost. All the provisions of this paragraph are to apply as per the agreed rates. The future ordinary maintenance expenses on poles, as per this paragraph, which are not replaced, shall be distributed on the regular half and half basis.

Tenth: That when either company wishes to place equipment on the poles of the other, which are located on a street, avenue or other public thoroughfare, it shall purchase an interest in same at the agreed rates and in the usual manner. An exception to this shall be a case in which the occupancy is of a temporary nature, when the contact rental basis shall apply. An occupancy for six months or less shall be considered of a temporary nature.

Eleventh: That on new joint work the maximum span shall not exceed 125 feet or be less than 100 feet. Also that on reconstruction joint work the particular company which does the rebuilding shall give the other owner, free of expense, a one-half interest in any new extra poles set. An exception to the rule, as per the preceding sentence, will be a case in which the average length of the old spans involved was more than 125 feet. The other owner shall, in that event, buy from the rebuilding company a partial interest in enough of the new extra poles set to make the average length of the reconstructed spans 125 feet or less with a minimum span of 100 feet. In addition the erecting company shall give to the other owner, free of expense, a one-half interest in any extra poles which may be set between existing spans in a joint right of way. The erecting company shall also reimburse the other owner for the expense which may be incurred in attaching the latter's equipment to the said extra poles.

Twelfth: That a guy wire attachment (alone) of one company to a pole which is the exclusive property of the other company, shall not count as a contact. Such attachments shall be made only on formal permit, for purposes of record.

Thirteenth: That poles thirty-five feet in height, with seven inch tops, will ordinarily care for both companies' respective needs on the usual joint basis. The ———— Electric Company will then have the use of the two top gains in each pole, spaced as shown in drawing, Figure 1, attached herewith. Below this is the prescribed neutral space on each pole. The ———— Telephone Company will have the use of the balance of the serviceable portion of each pole, and it will have the right to attach a buck arm in the neutral space, eighteen inches (center to center) above its upper cross arm. It is understood that no transformers will be attached to any joint thirty-five foot pole and that the ———— Electric Company, when it becomes necessary to install a transformer at the location of any joint thirty-five foot pole, will replace same with a pole forty feet in height, with a seven inch top, spaced as shown on drawing, Figure 2, attached herewith. Either company may, at its option, have erected in each joint right of way in each block one pole which is forty feet high, with a seven inch top. In addition to this, in some instances the joint needs of both companies may require the selling of poles which are more than thirty-five feet in height with seven inch tops. The preceding sentence applies to rights of way in which obstructions, etc., exist. The half and half basis shall apply to all poles which may be erected as per this paragraph.

Fourteenth: That the particular company which requires for its own individual purposes in any given right of way, poles which exceed thirty-five feet in height with seven inch tops, shall pay for such extra heights or extra top diameters, plus one-half the cost of the regular sizes. Thus, for example, as a thirty-five foot, seven inch top pole would, ordinarily, care for both companies' respective needs at a given location, and further, as the ———— Electric Company requires for its own individual purposes, at that point, a pole of the same diameter but five feet higher, the ———— Electric Company would, in that event, and at the present agreed rates, pay for—

(a) One-half the cost of a 35 ft. 7 in. top pole	$6.50
(b) Plus the difference in cost between a 35 ft. 7 in. top pole ($13) and a 40 ft. 7 in. top pole ($14.70)	1.70
Total	$8.20

This $8.20 represents four-sevenths of the value of the pole. Ordinary maintenance expenses shall be distributed on the basis just indicated; that is, the ———— Electric Company would bear four-sevenths and the ———— Telephone Company three-sevenths of such expenses.

Fifteenth: That in the foregoing the phrase "the company" refers to that owner which has the right of way, and the phrase the "other company" refers to the joint owner or prospective joint owner which is seeking space on the poles of the company owning the right of way.

Various ivory and bone acoustic devices, with coils of wire, have been found in Pharach's tomb. Perhaps the telephone is not so new as we think.

THE WEST VIRGINIA CONVENTION.

THE West Virginia Independent Telephone Association held its third annual convention at Fairmount, May 7 and 8.

At the opening of the meeting the regular order of business was suspended to permit the introduction of a resolution by W. S. Handlan, denouncing the purchase of telephone apparatus from other than Independent dealers, which was adopted unanimously.

President A. S. Davis then addressed the meeting praising the advance of Independent telephony in West Virginia and deploring the publication of attacks on telephone securities, with the statement that such assaults discredit both sides of the telephone business.

The treasurer, Lloyd Beeghley, then reported a balance on hand sufficient for present requirements, international association dues and all other obligations having been paid.

Reports from members of the association showed very encouraging conditions among the companies forming the association.

President Davis then introduced the mayor of Fairmount, Hon. M. M. Neely, who gave a very interesting address of welcome. Mr. Neely drew a parallel between conditions obtaining in a state of religious monopoly and the same condition in telephone service, stating that indications point to a consistent decline of all monopoly. He thanked the representatives of the telephone business present for bringing their service within the means of those in moderate circumstances, to whom, but for the Independent companies, the telephone would be a luxury.

T. B. Lee, of Greene county, Pennsylvania, gave an interesting and encouraging report upon Independent conditions in this territory, dwelling especially upon the successful outcome of a struggle with the opposition.

R. M. Dalzell, of the National Telephone Company of Wheeling, described a recent trade tour of the state, during which connection was made over Independent lines from the railway coach back to Wheeling from every town stopped at.

Reports indicative of prosperity were made by Mr. Pritchard of the Riversville & Montana Telephone Company; James T. Criss of the Fairmont and Western Telephone Company; J. B. Cather of the Flemington Telephone Company P. W. Low of the Winfield Valley Telephone Company; W. F. Stout of the Bridgeport Telephone Company, and the Clarksburg and Mannington Telephone Company.

The following papers were then presented: Unity of Interest, by J. Walter Barnes; How Best to Meet Competition, by Charles Berg; Telephone Securities, by W. C. Handlan; and the Future of Independent Telephony, by A. C. Davis.

A. C. Lindemuth, president of the International Independent Telephone Association, was called upon to explain the stamp used to raise funds for the association.

The following officers were unanimously elected for the ensuing year:

President, J. Walter Barnes, Fairmount; vice president, first district, J. H. Wise; second district, C. L. Aiken; third district, E. K. Hertford; fourth district, Hugh Amos; fifth district, L. H. Henry; secretary, W. C. Handlan, Wheeling; treasurer, Lloyd Beeghley, Weston. The executive committee consists of Messrs. Handlan, Barnes, Beeghley, A. C. Davis and Charles Berg.

Delegates to the international convention were then elected as follows: J. Walter Barnes, W. C. Handlan, A. C. Davis and Lloyd Beeghley. Alternates, J. E. Cochran, W. Frank Stout, J. O. Nay and J. U. Joliffe.

The delegates and a number of the business men of Fairmount attended a banquet given by the Consolidated Telephone Company, at which the merchants and representatives of all lines of business joined in praising the Independent telephone movement.

TELEPHONE LEGAL DECISIONS

A Compilation of Recent Decisions in Telephone Cases Rendered by the Upper Courts.

By R. R. Rossing.

[Hereafter TELEPHONY intends to report in this department the recent important supreme court decisions affecting telephone companies and telephone affairs. This service will be complete and up to date, including all of the courts of last resort in the United States. Managers and attorneys of telephone companies will find this department a great time-saver, as by glancing over the decisions contained therein they can obtain in ten minutes information of late cases that otherwise would require research and study of law reports covering several days. Following the headline, briefly describing the case, is given the syllabus delivered by the court condensed into few words yet covering the point of law interpreted. The names of the litigants, the name of the court and the volume and page number of the law reports are appended. For the convenience of its readers TELEPHONY has arranged to supply complete decisions of all cases mentioned in the legal digest for a nominal charge.]

ACTIONS AGAINST TELEPHONE COMPANIES.

A TELEPHONE company, operating a telephone system with exchanges in towns, when sued by another company, operating a system with an exchange in a city to compel the former to receive and transmit the messages of the latter, as required by Const. § 199, providing that telephone companies operating exchanges in different municipalities shall receive and transmit each other's messages, may defend by showing that the latter company has not acquired a franchise in the manner prescribed by sections 163 and 164, relating to the granting of franchises to telephone companies, since the act of the city in consenting to the latter company operating a system does not vest the latter company with legal rights and give it a standing in court that can only be obtained by a compliance with the law.—*Rural Home Telephone Company v. Kentucky & Indiana Telephone and Telegraph Company, Court of Appeals of Kentucky, 107 Southwestern, 787.*

MUNICIPAL REGULATION OF TELEPHONE RATES.

Transportation Law, Laws 1890, p. 1151, c. 566, art. 8, providing for organizing telephone companies, provides in section 102 (page 1152), that such companies may construct and maintain their lines on, over, or under any of the public roads, streets, and highways. Held, that where a telephone company entered into a contract with a city whereby, in consideration of the company agreeing to charge only certain rates for service, the city granted it the privilege of constructing its lines not only in the public streets and high ways but also in, over, and under the squares, parks, aqueducts, and other public places in the city, the company was estopped from questioning the right of the city to make the grant, and from repudiating that part of the contract limiting the rates.—*Rochester Telephone Company v. Ross, Supreme Court of New York, 109 N. Y. Sup. 381.*

DAMAGES FOR FAILURE TO GIVE SERVICE.

In an action against a telephone company for failing to connect plaintiffs' private line with defendant's exchange, in accordance with the contracts under which its franchises were obtained, plaintiffs were entitled to recover such damages as would reasonably compensate them for the loss, if any, of the value to them of the telephone service they were entitled to receive of defendant, between the date of the completion of their private line and the time of the trial, less the rental cost to them, at the rate provided by the contract, of the transmitters and receivers that defendant would have been required to furnish them during the same time, such damages not to exceed the amount claimed in the petition.—*Cumberland Telephone & Telegraph Company v. Cartwright Creek Telephone Company, Court of Appeals of Kentucky, 108 Southwestern, 875.*

TREE DAMAGE TO BE ASSESSED BEFORE CUTTING.

Under Rev. St. 1889, §§ 1264, 1271 [Ann. St. 1906, pp. 1033, 1044], providing for the condemnation of lands sought to be appropriated by a telephone company, where it and the owner cannot agree, and that, where property will be damaged, any person interested may have the damages ascertained, etc., a telephone company maintaining its poles and wires in the streets of a town must have the damages to trees owned by an abutting owner assessed before the trees are cut; and where the company makes no effort to agree with the owner or to have the damages assessed, but sends an employe with directions to remove the trees, the company is a trespasser, and the cutting of the trees is without right.—*State v. Graeme, St. Louis Court of Appeals, Missouri, 108 Southwestern, 1131.*

WATER COMPANY CANNOT OPERATE COMMERCIAL TELEPHONE SYSTEM.

Where, by the terms of a grant of a right of way to a water company for the construction of such telegraph and telephone lines as might be incidentally necessary to the operation of its water plant, the possession and use of the right of way was reserved to the grantors subject only to the grant, the entrance on the right of way by a telephone company for the purpose of constructing new and additional lines for the maintenance and operation of a commercial telephone system was a violation of the legal rights of the grantors, and constituted a trespass.—*Northeastern Telephone & Telegraph Company v. Hepburn, Court of Errors and Appeals of New Jersey, 69 Atlantic, 249.*

RIGHT TO CONNECT PRIVATE LINE WITH EXCHANGE.

Where plaintiffs' right to have their private telephone line connected with defendant telephone company's exchange was conferred by contracts under which defendant obtained its franchises from a city and county, and conditioned on defendant's failure to build the necessary line and furnish plaintiffs' telephone service, which contracts were in writing, one in the form of an ordinance, and the other as an order or judgment of the fiscal court, the statute of frauds did not bar plaintiffs' right to compel defendant to make the connection.—*Cumberland Telephone & Telegraph Company, Court of Appeals of Kentucky, 108 Southeastern, 875.*

TELEPHONE COMPANY MUST PAY FOR DAMAGES TO TREES.

A telephone company occupying a street with its poles and wires, under permission of the authorities of the town as authorized by Rev. St. 1899, § 1251 [Ann. St. 1906, p. 1027], is a mere licensee, and its rights are subordinate to the rights of an abutting owner owning the fee to the center of the street, subject to the easement of the town, and having trees inside the curb line, subject to the right of the

town to remove them, and the company must pay for the removal of or damages to the trees.—*State v. Graeme*, St. *Louis Court of Appeals, Missouri, 108 Southwestern, 1131.*

CONTINUANCE OF INJUNCTION AGAINST TELEPHONE COMPANY.

Where a telephone company violated the property rights of owners of land by going thereon and constructing telephone lines without any right whatever, an injunction restraining the property owners from interfering with the construction of the lines will not be continued until compensation to such owners may be ascertained and made by the telephone company, in the absence of laches or acquiescence on the part of the property owners.—*Northeastern Telephone & Telegraph Company v. Hepburn, Court of Errors and Appeals of New Jersey, 69 Atlantic, 249.*

ILLEGAL ASSESSMENT OF TELEPHONE COMPANY STRICKEN FROM ROLL.

On certiorari to review an assessment, where the return of the town board of assessors showed that a telephone company owned no real estate in the town which had not been assessed by the State Board of Tax Commissioners, and that all its property in the town consisted of its poles, wires, etc, which were located on the public highways, an assessment of real estate in the town will be stricken from the roll.—*People ex rel. Glen Telephone Company v. Hall, Assessors, Supreme Court of New York, 109 N. Y. Supp. 402.*

PRIVATE TELEPHONE LINE FRANCHISE.

Where a telephone company purchased from a city and county franchises to operate its system, agreeing to furnish any person for whom it might not construct a line, telephone service over the line constructed by such person, parties constructing for their private use and not for operation in competition with the company's system a connecting line were not required to obtain a franchise therefor.—*Cumberland Telephone & Telegraph Company v. Cartwright Creek Telephone Company, Court of Appeals of Kentucky, 108 Southeastern, 875.*

NEGLIGENCE OF COMPANY A QUESTION FOR JURY.

In an action against a telephone company maintaining its wires along the public highway for injuries sustained by a traveler coming in contact with a fallen wire, the question of negligence of the company held for the jury, though there was evidence of an inspection two weeks before the accident and the wires were in fit condition for sending messages until the accident.—*Crawford v. Standard Telephone Company, Supreme Court of Iowa, 115 Northwestern, 878.*

COMPANY'S CONTRACT TO GIVE SERVICE OVER PRIVATE LINES.

Where, under its franchises from a city and county, defendant telephone company contracted to furnish any person for whom it might not construct a line telephone service over a line of his own construction, defendant could not, after standing by and seeing plaintiffs practically complete a private line, refuse to connect such line with its exchange on the ground that it was itself willing to build the line.—*Cumberland Telephone & Telegraph Company v. Cartwright Creek Telephone Company, Court of Appeals of Kentucky, 108 Southeastern, 875.*

LIABILITY OF TELEPHONE COMPANY TO ADDRESSEE.

Where defendant telephone company undertook to summon plaintiff to its office at a certain town to answer a long-distance call, knowing that the sender of the message intended to employ her, and by reason of the negligence of defendant in summoning her she lost her employment which would have been a benefit to her, she had a right of action for damages.—*McLeod v. Pacific Telephone Company, Supreme Court of Oregon, 94 Pacific, 568.*

TELEPHONE CHARGES TO CO-PARTNERS.

Physicians using connecting offices and conducting a co-partnership as to "minor surgery," and having a private individual practice in other lines, are co-partners within the schedule of rates authorizing a telephone company to charge co-partnerships for the use of one telephone $3.50 per month.—*Manning v. Interstate Telephone & Telegraph Company, Supreme Court of North Carolina, 60 Southeastern, 1134.*

ILLEGAL TAXATION OF TELEPHONE COMPANY.

Where a telephone company showed a town board of assessors that it had no real property in the town other than assessed by the State Board of Tax Commissioners and its poles and wires in the public highway, an assessment against it for real estate in the town was illegal.—*People ex rel. Glen Telephone Company v. Hall, Assessors, Supreme Court of New York, 109 N. Y. Supp. 402.*

ENFORCEMENT OF TELEPHONE COMPANY'S CONTRACT BY CITIZEN.

A citizen of a city was entitled to insist on the enforcement of a contract between the city and a telephone company limiting the rate to be charged subscribers for service.—*Rochester Telephone Company v. Ross, Supreme Court of New York, 109 N. Y. Supp. 381.*

CONSTRUCTING TELEPHONE LINES ON PRIVATE PROPERTY.

In an action for damages to land caused by the erection thereon of a line of telephone poles and wires, the measure of damages is the difference in value of the land before and after the burden of easement thus imposed upon it.—*Wade v. Carolina Telephone & Telegraph Company, Supreme Court of North Carolina, 60 Southeastern, 987.*

SUBSCRIBER'S RIGHT TO DEDUCTION FOR INTERRUPTION.

A telephone subscriber is only entitled to a deduction from his bill on account of interrupted service for interruption after the expiration of a reasonable time after the company has notice of the trouble.—*Eastern Kentucky Telephone & Telegraph Company v. Hardwick, Court of Appeals of Kentucky, 106 Southwestern, 307.*

CORPORATION'S AUTHORITY TO DISCONNECT RURAL ASSOCIATION FROM SWITCHBOARD.

Though a consolidation and incorporation of informal rural telephone associations was projected, to obtain the advantage of connection through a switchboard in connection with other telephone lines, defendant and other members of one rural association never consented to the transfer of the joint property to the corporation subsequently formed by members of the several associations, and the corporation never assumed to accept such property nor the members of such rural association as its members. The only connection between such rural association and the corporation related to the switchboard connecting all the lines, which the corporation assumed to own and operate jointly with another line. Held that, while as to the switchboard, defendant was bound to contribute ratably to its maintenance on penalty of having the switchboard service discontinued as to him, if the corporation owned an interest in and was obligated to maintain it, the corporation cannot compel a severance of his connection with the line owned by the rural association for his failure to pay an assessment covering the expense of maintaining the switchboard.—*Middle Branch Mutual Telephone Company v. Jones, Supreme Court of Iowa, 115 Northwestern, 3.*

A Fight With an Octopus

By Paul Latzke

The Story of the Bell Company's Rise to a Power that was second only to that of the Standard Oil Company—The Betrayal of Friends and Associates, The Sacrifice of Great National Characters and the Desperate Purpose of a Fight that was Carried Straight into the White House.

A FOREWORD.

[This story should appeal especially to those who have good, red American blood in their veins. It is the story of a magnificent fight that was won against overwhelming odds. It is the story of a smug coterie of "Boston gentlemen" of the immaculate type, put to flight by a few sturdy men out of the west. It is the story of a low, scheming campaign of greed, that was turned into a rout by a fine, sentimental, American citizenship. It is a story full of dramatic interest, not because of the manner of telling, which is simple and commonplace enough, but because of the facts it relates.

It is the story of at least one trust that was "busted." It is a story that, while dealing with the details of an industrial war, will interest even the women, for it is full of good, clean, honest fighting, of the deeds of men who stood shoulder to shoulder under the Stars and Stripes, and, in the name of American freedom and independence, lined up against the most complete and relentless and successful monopoly of the times—and beat it to a pulp. It is a poor sort either of man or woman who cannot find somewhere in the record of these fighters the story of a deed that will stir the pulse.— THE AUTHOR.]

CHAPTER XIII.

A MOVEMENT OF THE PEOPLE.

MATTERS moved along so fast with these home companies that, by 1897, four years after the expiration of the first Bell patent, there were enough of them in active operation to warrant the formation of a national organization. This organization had some vicissitudes, but it continued in uninterrupted existence and to-day is on a very sound and substantial basis. Its object is primarily to hold the Independents in solid front against the opposition of the Bell people. Its membership embraces a very large per cent of the ten thousand Independent companies of the United States, and it is being recruited steadily. It is thoroughly representative in form. The national body is made up of the various state organizations, which, in turn, are constituted out of district, county, city, and township organizations. This unit plan has been in operation only a little while, but already the organization is so nearly perfected along these lines that, with few exceptions, every state is represented.

An excellent idea of the popular character of the opposition telephone movement is to be had at the annual conventions of this central body, which is known as the International Independent Telephone Association. Instead of the topics ordinarily discussed at conventions of commercial organizations, one hears here the sort of speeches common to political conventions. The delegates themselves are fully aware of the national spirit that lies behind their association and do their best to keep it alive. At a meeting of the central body held in Buffalo, some years ago, the president of the association said, in his annual address:

"In speaking of the conventions held by this organization I have heard several gentlemen who have attended them say that the general tone resembles more political conventions than conventions of allied business interests. I have always agreed with that statement. Like public conventions, we have never lost sight of the principles of progress and fair dealing with the people, and, being so different from the meetings of the men who control the Bell companies, this impression has found lodgment in some minds. This spirit we desire shall always be the keynote of all conventions of the organization."

The character of the Independent telephone business has changed somewhat in the past two or three years. Consolidations have been effected between many companies operating in contiguous territory. Important "long-distance" corporations have been organized to connect towns and districts comprising, in some instances, the better part of a state. There are many companies in existence whose capitalization runs into the millions. One company, in fact, has a capitalization of fifty million dollars. The securities of this company and many others are extensively dealt in on the local stock exchanges in the various cities in which they operate. The Independent service has grown beyond the limits of the small towns in which it started, and spread into such big cities as Cleveland, Baltimore, Pittsburg, Buffalo, St. Louis, Kansas City, Rochester, Louisville, and others. But, for all these changes and all this growth, they are still "home companies," and the home feeling is as strong as ever. They still have the people behind them, local pride, and local capital. This, to my mind, is their best asset. It has kept the business sound, and, for the most part, it has kept it out of the hands of speculators. At times some of the more ambitious spirits in the industry, finding their local money markets too limited to meet the demand for a rapidly expanding plant, have turned to New York for assistance, but without success. Wall street knows practically nothing of the Independent telephone business and cares less. This is considered by some Independents a severe handicap, but most of them deem it a good thing and I agree with them. Wall street's touch is blight for any people's movement such as this. Let it once secure the indorsement of the stock exchange, and its popular character will be a thing of the past. Fortunately there is no danger of this. Wall street is too narrow and too ignorant ever to meddle with an industry until it is rubbed into the exchange list by a lot of stock-jobbers. Wall street knows nothing of the things that are doing in the real world. Its horizon is limited by the Hudson river on the west and Central park on the north. So far as "the street" knows, there is only one telephone system on earth,—can be only one. Even Henry Clews, who sends daily letters through-

out the country about the "movement of crops" and other things that are supposed to affect stock values, holds blissfully to this idea.

"Opposition? Nonsense!" he said to me, one day, with that finality that characterizes the sages of Wall street. "How can there be opposition, when the Bell company controls all the patents on telephone apparatus?"

"Not any more, Mr. Clews," I ventured, mildly,—"not for years. Anyone can make telephones and switchboards to-day, and the Independents are turning out more than the Bell, very many more."

"Absurd, perfectly absurd!" declared the eminent financier; "never heard of such a thing."

"Nevertheless it is true."

"What are they doing with 'em?"

"Putting them into service."

Thereat Mr. Clews chuckled and gazed at me meditatively. Knowing my Wall street and its great men, I didn't resent this, but gave him some figures.

"The Independents have at least half a million more subscribers than the Bell people. In Ohio they've over 200,000, while the Bell has less than 110,000; in Indiana they've 165,000, while the Bell has only 35,000. In the city of Los Angeles the Independents have nearly 25,000, against the Bell's 15,000. In Kansas City, Indianapolis, Louisville, Toledo, Rochester, and scores of other centers, the Independents have the other fellows licked, badly licked. In Toledo, for example, the Independents have 8,500 stations in operation, and the Bell has less than 3,000. And the Independents have only now fairly begun to develop the big cities. In San—"

"Say," interrupted Mr. Clews, bland and smiling, "you must be a promoter. I never heard such yarns."

I gave it up and grew bland in my turn, for it is folly to take Wall street seriously unless you are playing the market. Nor are Mr. Clews and his friends in Wall street so very much to blame for their belief, held in all honesty. The Bell company is supreme in the telephone way in "the street," whatever may have happened to it elsewhere, and it makes full use of its influence here to show that "there is nothing to the opposition except the promoter." For a long time, indeed, the controlling spirits in the trust really held this belief. The only force, to their minds, that kept the movement alive and pushed it on was the promoter, working in the interest of his employer, the manufacturer of "worthless infringing" apparatus. This opinion, held in all sincerity, had much to do, no doubt, with the fatuous blindness of the Bell managers. It led them to continue in their arrogant course toward the public long after ordinary business prudence should have taught them differently.

At the outset of competition it would probably have been an easy thing to halt the movement,—perhaps even to snuff it out entirely. But that would have been at the cost of revolutionizing the monopoly ideas of the Bell, an impossible supposition. The people really wanted peace, and their "uprising" came only when peace was denied them; that is, peace with justice. Here is an example:

One of the promoters so odious to the Bell gentlemen entered Butler, Pennsylvania, and started at once to interest the leading citizens of the place in the organization of a local telephone company. He met with warm encouragement, for Butler was suffering at the hands of the monopoly, like every other community. A corporation was organized which had for its chief stockholders and directors sixteen of the foremost men in the city, many of them millionaires.

The Bell subscribers were being taxed $60 a year for business and $48 for residence telephones. The Independent company began to solicit contracts on the basis of $48 a year for business, and $36 for residences. Everything moved along like clockwork, and on Tuesday of a certain week matters were in shape for the signing of a contract for apparatus. The promoter met the directors by appointment, with the contract in his pocket. To his great disappointment he was told to wait till the following Friday, but on Thursday he received a sudden message asking him to come around that afternoon with his contract. He found all of the sixteen directors assembled. The president said that, before signing, he felt that he owed it to the promoter to make a statement.

"Frankly," he said, "we did not like the idea of a double telephone system in this town; so at the last moment, we decided to lay the facts before the Bell people. We sent a delegation to Pittsburg to tell the company that, if it would reduce its rates here to $48 and $36 a year, we would bind ourselves not to start or even to encourage the starting of an opposition company, and that we would sign contracts for five years. The Bell gentlemen refused absolutely to consider the proposition. They told our delegation that they knew how to run their business and did not require any instruction, advice, or suggestion from us. Therefore we are ready to go ahead with you."

Within two months of the time the contract for the apparatus was signed, and after construction work was well under way, the Bell company sent a special representative posthaste to Butler. His principals, this agent said, would reimburse the Independent stockholders for all their outlay, would take the apparatus off their hands, would give all of the directors free service for ten years, and would fix rates of $48 and $36 per year for all the citizens of Butler. The answer to this was that the Bell had had its last chance in the town and that the directors of the Independent company would not give up their plans for all the money the Bell had to offer, nor accept an offer of free service if it were given them for the balance of their lives. Several other efforts were made to stop the enterprise, but they all proved in vain.

CHAPTER XIV.

THE FATE OF A TRAITOR.

Is it strange that men whose business is born of such conditions regard it in a different light from the ordinary commercial venture, and bring to their annual conventions more talk of "unity, liberty, and progress" than of trade, traffic, and the almighty dollar? So intense is this feeling among the Independents that it actually breeds a spirit of fanaticism, and he is a bold man who turns traitor to the "cause,"—for so it is regarded, a "cause." The political or religious turncoat has an easy time of it compared with the man who proves disloyal to the Independent telephone business and sells out to the Bell. It is probably difficult for the ordinary business man to understand why a person should not have the right, unchallenged, to sell his property to anyone he pleases, even if that property consists of a majority of the stock of an Independent telephone company, which can be turned over to the Bell at a fancy figure. But, to the men in this movement, the moral wrong in such a transaction is as plain as day; they would as soon concede that Benedict Arnold had a right to sell out to the British. Nor does their argument lack force or logic. They insist that, when a man or a body of men organizes an Independent telephone company, it is not only the money paid in for apparatus and equipment that is capitalized, but the good will, support, and friendship of their neighbors as well. Further, such Independent companies, when organized, enter into a moral pledge of support and fellowship with the other Independent companies in the vicinity, under the terms of which these companies tie up with arrangements for the exchange of traffic and the guaranty of mutual support. No man can thus sell an Independent plant to the Bell Telephone Company without also selling out his neighbors and the interests of his associates in the industry with whom he is exchanging business. It is this situation that

causes an uprising whenever an Independent falls to the money lure of the Bell company, as has happened in many instances. Hurried meetings are called, and at these meetings we hear speeches that savor of the old days when men were actually in arms for their independence. An inquest is held on the offender and he is formally branded "a traitor to the cause." An excellent idea of what happens to such a "traitor" is furnished in the case of a prominent banker of Indiana—Hugh Dougherty. This man was one of the pioneers in the movement. He owned a country bank at Bluffton, and became president, in 1894, of an Independent company organized in that city. As he was related by marriage to the wealthy Studebaker family, his enrollment in the Independent movement gave it a very strong impetus. From Bluffton, Mr. Dougherty spread his telephone interests, until they embraced four counties—Huntington, Wells, Blackford, and Grant. In this domain the banker was absolute and he was looked upon as one of the strongest figures in the business. As a tribute to his worth and an acknowledgment of the value of his efforts, the Independents of the country elected him president of their national association, the highest honor they could pay. Mr. Dougherty held this office until the annual convention of 1904, held at St. Louis. Then, at his own request, he was retired and elected to his former office, that of treasurer of the association. Eight months later, in May, 1905, the industry was startled by rumors that Dougherty had "sold out." At first there were few to credit these rumors. The banker's long, honorable record in the cause was rehearsed in refutation. His speech on retiring at St. Louis, breathing faith and loyalty in every line, was brought out.

"We hope," he had said, "that we will not lack in fealty to one another and to the interests we represent; so, as we take up the sacred burdens laid upon us by the people who have placed their trust in our care, we should reverently and joyfully bear them on to triumph and unitedly bring about results that will benefit all the people, including the manufacturer, operator, and patron.

"So each owes a duty to the other, and selfishness should not be the dominating spirit in our deliberations, or, after them, in the practical operation of our business.

"The world is sustained by four things only,—the learning of the wise, the justice of the great, the prayers of the good, and the valor of the brave."

These extracts from Mr. Dougherty's address are interesting, because they give a concrete example of the sort of speeches one hears at Independent conventions. Further, they are interesting because they help to make clear the things that happened to Mr. Dougherty when the disquieting rumors of the sale were confirmed by an official announcement. The industry was immediately in an uproar from the Atlantic to the Pacific. The territory that Mr. Dougherty had sold out was among the richest in the land, as his company was operating over five thousand telephone stations in a country made up entirely of small towns and farm townships. The Bell had been practically driven out of existence in the four counties. More serious still, this transfer to the enemy meant the cutting of the Independent long-distance lines at a most vital point. A hurried call for an emergency meeting was immediately issued. This was attended by representatives from the companies that had been exchanging business with the United Telephone Company, as Dougherty's organization was known. The man who had held such a high position in the councils of the Independents was formally read out of the ranks. The telephone press put the "traitor" on the grill in a way which he and his descendants will probably remember as long as they live. Here is what one of the periodicals had to say:

"His neighbors, trusting his assurance that he stood for industrial liberty, voted him valuable franchises. His clients, believing in his probity as a banker, gave him their savings to invest in the stocks of the Independent telephone company he controlled. His associates in the industry, misled by his profession of loyalty, connected their properties with his own and yielded him unchallenged domination of one of the richest territories in the telephone field. Wherever and whenever he needed assistance, support, or encouragement, it was freely and cheerfully given by his neighbors, his clients, and his associates. And without a qualm, without warning, he sells them all out to the enemy. Could anything be more shameful?

"All decently constituted men hate and despise a traitor. Hugh Dougherty is a traitor in the meanest form. A rich man, he sacrificed all considerations of honor, of moral obligation, of manliness, for money that he does not need. Trusted by his friends, he put them in cold blood on the block simply to satisfy his low greed. The price he received was not for the properties he had to sell, but for the confidence it was in his power to betray."

Nor did the matter end simply in talk and type. Mr. Dougherty had accepted, a short time before, the presidency of the Marion Trust Company, of Indianapolis. This city is one of the great centers of Independent development. The representative financial institutions there are heavily interested in telephone securities, and the Indianapolis operating company is one of the strongest in the land. The city is also headquarters for one of the great Independent long-distance organizations, operating as far as St. Louis on the west and Cleveland on the east.

Under these circumstances Mr. Dougherty naturally found his position pretty uncomfortable. S. P. Sheerin, the president of the Indianapolis Independent and long-distance telephone companies, immediately resigned from the directorate of Mr. Dougherty's trust company, and pressure was brought to bear on others to follow his example. A general social and business ostracism ensued. This ostracism reached an acute stage through the tragic death of Mr. Sheerin. That gentleman, like Mr. Dougherty, had been one of the pioneers in the Independent telephone business. The two were close friends. When the banker turned "traitor," it was said that it would "break the heart of Sheerin," who was a passionate devotee of the "cause." Whether or not this actually occurred, he certainly died within a month of Dougherty's "sell-out" and under circumstances that riveted the attention of the entire country. He had gone to Chicago to attend the national convention of the Independents, at the Auditorium. He was on the platform, facing a hall packed with his associates, and replying on behalf of the association to the mayor's address of welcome, when his voice suddenly failed. His form swayed an instant, and then he sank to the floor, unconscious. In half an hour he was dead—of apoplexy, the doctors said. But among the laymen, his friends, there was much bitter talk of other causes than apoplexy and it was just as well that Mr. Dougherty, formerly the great figure at these conventions, was not present on that occasion to hear himself discussed.

It is not my purpose to analyze Mr. Dougherty's sale to the Bell company. Every man can decide for himself whether or not the banker was morally or ethically justified in selling his stock to the best advantage. There is only this to be added. The sale checked only for a moment the headlong course of Independent progress. The company sold out by Dougherty is being rebuilt with marvelous swiftness; the towns and villages have granted new franchises to new companies; the local capitalists and their allies in other sections have furnished new money to carry the work on; the gaps in the long-distance lines have been filled up, and in a short time, it is prophesied, the Independents will have more telephones in operation in this territory than ever before, and the Bell company will find the half million or more that it paid, to kill competition thrown away.

THE MISSOURI CONVENTION

Independent Telephone Men of Missouri Held a Most Successful Meeting at Kansas City.

By J. C. Ames

THE annual convention of the Missouri Independent Telephone Association, which was held at Kansas City, May 6 and 7, was attended by over 400 delegates and supply men. The mayor of that city, T. T. Crittenden, in his welcoming address paid an incidental but interesting tribute to the telephone, stating that in an hour and a half he had talked by telephone with eighty-five per cent of the voters of his precinct—a task which would have consumed some days in actual interview.

The president of the association, Houck McHenry, commented upon the satisfactory growth of the year, dwelling particularly upon the work of the traveling secretary, W. R. Barkdull, pointing to the personal visit as a factor in sustaining enthusiasm. He urged that the farmers' lines receive the utmost consideration from Independent companies, in view of the fact that the opposition was making efforts to absorb them. A permanent legislation committee and a monthly bulletin were also emphasized by Mr. McHenry as desirable.

The association was reported in excellent financial condition, having removed considerable floating indebtedness, and paid the international association assessment. The report of the secretary, G. W. Schweer, showed receipts of $1,950.22, and expenditures of $1,958.59, leaving a deficit of $8.37. The expenses of the traveling secretary and the payment of a $500 debt were included in the expenditures. Mr. Schweer urged that last year's assessment of two cents per unit be increased to an assessment not to exceed five cents per unit. In his address Mr. Schweer said:

"There are about 550 Independent telephone companies in Missouri, 53 Independent switchboards, 175,000 to 200,000 Independent telephones. There are less than 50 towns that have Bell switchboards, with about 57,000 Bell telephones.

"The capital stock paid up in Independent telephone companies in Missouri is $12,000,000; estimated, their bonded and floating indebtedness and undivided earnings is at least $13,000,000. We have invested in Independent telephone interests $25,000,000. No industry in the state has done as much to advance up-to-date methods of communication, no industry in the state has done as much for the farmer to make him content with his occupation and put him in touch with the world.

"There is no industry that demands so much co-operation for success as does ours. One Independent telephone company does not make a system; we, therefore, must depend on one another for the success of the Independent telephone system.

"To establish a thorough Independent telephone system in Missouri we must be of one accord on business relations between our different plants. Each Independent operator controls his own plant, and operates it in a way most satisfactory to himself, but there is a closer business relation between the different Independent telephone plants than in any other class of business in the state."

R. E. Mattison of Nebraska, stated that a ten cent per unit assessment was not found burdensome in his state, and had been reduced to six cents because of the increased number of units in the association. He also described the handling of toll business through a clearing house as quite satisfactory.

L. M. Grimes of Iowa and F. P. Zimmerman of Kansas spoke of conditions in their respective states.

Papers were then read as follows: The Advantages of Common Battery Over Magneto Equipment, by Pasca. Parker; the Trouble Man, by M. L. Golladay; Toll Traffic, by W. B. Bentley.

O. C. Snider of Kansas City then suggested that a number of bills on telephone matters would probably lie before this state legislature in 1909, and his motion, that a committee of four be appointed to watch legislation, was carried.

On the second day of the convention, J. B. Ware, secretary of the international association, mentioned the importance of obtaining statistics and making assessments to carry on suits under the Sherman anti-trust law. James H. Shoemaker, president of the Iowa association, spoke against buying supplies from any but Independent dealers, and papers were read, by Theodore Gary of Macon, on the Cost of Exchange Telephone Service, by C. O. Raine of Canton on Rural, Mutual and Co-operative Telephone Service, and by Oliver Jones on the Right Attitude of a City Company Toward a Rural Company.

The following officers were elected for the ensuing year: M. L. Golladay, president; T. W. Schweer, secretary; H. M. Taliaferro, treasurer. The executive committee was then appointed, comprising the president, the secretary, C. J. Myers, W. A. Bassett and J. P. Geers. The committee recommended that the traveling secretary prepare a map of toll lines; that a traffic committee be created; that blank forms for accounting be prepared; and that members be furnished with certificates of membership upon payment of dues.

Messrs. Snider, Golladay and Basset were appointed to investigate a proposition offered by an insurance company to underwrite operators' risks and pay a commission of twenty-five per cent of the unexpended premium into the association treasury.

Most of the members attended a dinner at the Midland Hotel during the course of which old songs and new toasts went the rounds.

The following manufacturers and dealers exhibited at the convention: Stromberg-Carlson Telephone Manufacturing Company, American Electric Telephone Company, Illinois Electric Company, Homer Roberts Telephone Company, Interstate Electric Manufacturing Company, Swedish-American Telephone Company, and Frank B. Cook, Chicago; Commercial Electric Supply Company and Central Telephone & Electric Company, St. Louis; Century Telephone Construction Company, Buffalo, N. Y.; Cracraft-Leich Electric Company, Genoa, Ill.; Sterling Electric Company, Lafayette, Ind.; North Electric Company, Cleveland, Ohio.

CLEVELAND CLUBS AMALGAMATE.

THE Electric Club and the Civil Engineers' Club of Cleveland amalgamated April 18, 1908, and the lists of officers and members are issued under one cover. The rooms of the club are at 718 Caxton Building, Cleveland, which are open every day but Sunday from 11:30 a. m. to 10:00 p. m. The Civil Engineers' Club meets the second Tuesday and the Electric Club the first Wednesday of each month.

Digest of Telephone Literature
Conducted by E.M.Rothelle

[This digest includes the telephone articles printed in technical and scientific publications in all civilized countries. It is a complete index to the world's telephone literature. All publications are given numbers. The title appears first followed by author's name, number and date of publication; for example: 122-1-25-08 is Electrical Review of date January 25, 1908. Those desiring any article in this digest should address the publication whose key number is given below. The publications reviewed in this issue follow.—Editor.]

111—Western Telephone Journal, Vinton, Iowa.
121—American Telephone Journal, New York.
124—Electrical Age, New York.
141—National Telephone Journal, London, England.
142—Electrician, London, England.
143—Electrical Engineering, London, England.

The Increased Power of Better Telephone Equipment for Rural Telephone Lines. L. J. Flint. 111—5-1-08. After discussing the general proposition of rendering telephone service, a brief description is given of telephone systems for rural line use, the construction and circuits being so arranged that the central office can be signaled selectively without disturbing the remaining telephones connected to the line. The earth return system of signaling is employed. A brief description is also given of the general construction of magneto hand generators.

Telephone Accounting. George R. Fawkes. 111—5-1-08. The eighth installment of this series of articles is presented and covers agents' accounts and collections. Different card forms are given.

Collections. F. V. Newman. 111—5-1-08. The subject of collections is discussed in a brief manner. The paper was read before the recent convention of the Michigan Independent Telephone Association.

Preventable Cable Troubles. V. E. Furnas. 121—4-18-08. In the present installment of this article crystallized cables are discussed and methods are explained for locating the damage and repairing the same. One of the illustrations shows cracks on the inside of the sheath while the remaining illustration shows a cable damaged by electrolysis. It is stated that locating and repairing an electrolysis trouble cost $39.00, allowing two hours for locating the trouble and a half day for pulling in section of cable and pulling out the damaged section.

History of the Automatic Telephone. A. B. Smith. 121—4-18-08. Mr. Smith's article is continued in the present issue and details of switches and circuit connections are presented. The article is to be continued.

Local Operating Room Records. Kendall Weisiger. 121—4-18-08. Numerous articles upon this interesting subject have been presented by the same author. In the present installment card record forms are fully discussed.

Local Operating Room Records. Kendall Weisiger. 121—4-25-08. In the present installment of this series of articles time recording clocks and card forms for operators' records are illustrated and completely described.

Poulsen's Apparatus for Wireless Telephone. 124—4-24-08. Mr. V. Poulsen, it will be recalled, is the inventor of a certain method of producing undamped electric waves, which invention has been applied with considerable success in wireless telephony. In a paper recently read in London, Mr. Poulsen describes his experiments in telephoning something over 280 miles without the use of any connecting wires between the stations. The article is accompanied by illustrations showing the transmitting and receiving apparatus, the arc generator, and several illustrations showing photographic records of wireless telegraph messages and wave forms.

The Necessity for Corporation Forestry. E. A. Sterling. 136—1-1-08. This is an interesting paper dealing with a discussion of the conservation of natural resources, with particular reference to the probable and immediate shortage of timber suitable for all classes of work, and also the telephone and telegraph interests. Statistics are presented showing the enormous consumption of timber. It is estimated that there are something like 400,000,000,000 feet of hard wood timber now standing and if we are consuming approximately 25,000,000,000 feet per year the standing timber will only last sixteen years. Therefore it is not a question of the future but one of the immediate present as to where railroad cross ties and hardwood lumber will come from.

The Value and Application of the Scientific Spirit. A. B. Gilbert. 141—8-1-08. This is an abstract of a paper read before the Glasgow and West of Scotland Telephone Society, and discusses the various phases of work when done with a judicious application of scientific knowledge. Figure 1 is a table showing an analysis of line troubles for a period of six months. In this table it is interestingly shown that in an exchange of about 4,700 lines, the largest amount of trouble was due to broken wires. Short circuits stand second and contacts third, while accidental grounds stand fourth in line. For the entire period of six months there is a total of 5,230 cases of trouble, which gives something over one case of trouble per line for the period stated. A speed of answer test curve is also shown.

The Telephone Service from an Operator's Point of View. Margaret Sweeney. 141—5-1-08. This is an interesting discussion by an operator on the different duties required to be performed by a switchboard operator. A number of interesting suggestions are made. The effects of team work are considered a great benefit to the general quality of service.

A New Method of Obtaining Undamped Oscillations. O. M. Corbino. 142—4-24-08. This is a new method which proceeds by coupling a series dynamo with a shunt motor without condenser and is based upon the principle that a shunt motor with armatures and field magnets of laminated iron when subjected to an alternating sinusoidal P. D. applied to its terminal behaves like an inductive resistance whose inductance may have a negative value. The apparatus therefore is equivalent to an inductance in series with a capacity. For a certain speed the inductance and the equivalent capacity are independent of the frequency. The article consists of a mathematical demonstration of the effects obtained.

The Design and Use of Telephone and Telegraph Cables. F. Tremain. 142—4-24-08. This is an abstract of a paper read before the British Institution of Electrical Engineers Sections and deals with paper insulated lead sheathed cables, such as are used for telephone and telegraph circuits. The construction and use of such cables are explained and the article is accompanied by illustrative diagrams.

showing the arrangement of the wires and circuit connections.

Electrolytic Corrosion. Prof. W. W. Haldane Gee. 142—5-1-08. In a paper presented before the Manchester section of the Institution of Electrical Engineers of England, the author presents a collection of evidence and statistics relating to the cause of corrosion, and he appears to have made a large number of experiments on this subject, dealing particularly with the various conditions which may produce corrosion and offering suggestions as to its possible prevention. He discussed electrolysis due to stray currents and continuing with electrical endosmose, and also referring to alternating current corrosion. In the discussion of the paper a number of interesting points were brought out.

The Effects of Leakance and the Use of Heaviside's Distortionless Condition in Telephone Transmission. D. S. Cohen. 142—4-10-08. Telephone workers in general are familiar with the theory that a judiciously distributed leakage from a telephone line can produce beneficial results from a transmission standpoint. Mr. Cohen and Mr. Shepherd recently presented a paper upon Telephone Transmission Measurements. They discuss the subject of Leakance, stating that upon applying leakance to a telephone circuit that any increase in leakance sufficient to give distortionless condition in a cable is accompanied by so great an increase in the attenuation as to render the line unworkable in many cases. For example, in order to obtain the distortionless condition on an ordinary 20-pound conductor cable, it will require a decrease in the insulation resistance to about 200 ohms per mile loop and the attenuation is increased six fold. Therefore the improvement in articulation is considerably overbalanced by the increase in attenuation, and the net audibility of the line is consequently diminished. Upon taking a 10-lb. cable conductor, the same effect applies even more strongly. When we consider an open wire circuit, however, with a fairly heavy gauge wire, the distortionless point is reached with a much higher insulation resistance. For example, a 400-lb. open wire, 80,000 ohms insulation per mile gives no distortion and the attenuation increase is something under two times, but it is considered that even with this kind of a line, it is very doubtful that the improvement in articulation when set off with ninety per cent decrease in volume is improved in audibiilty. When Pupinized lines are considered, however, the leakance must be kept quite small. The author concludes by drawing attention to Dr. Drysdale's recent paper on the theory of alternating current transmission in cables being opposite to Mr. Cohen's theory as respects the leakance conclusions.

The Gerrard and Paddington Exchanges of the National Telephone Company. 142—4-10-08. The Gerrard exchange has an immediate capacity of something over 7,000 lines, which in connection with party lines, makes it equivalent to almost 21,000 stations. It is found that each operator is able to handle 81 subscribers' lines. The average number of calls dealt with by each operator per day being 700 and the busiest hours averaging 145. The Paddington exchange has an immediate capacity of something over 5,100 lines, but owing to the circuits not being so busy as the Gerrard exchange, each operator is supplied with 119 subscribers' circuits. Two 25-H.P. generators capable of giving 500 amperes at 36 volt are used for charging the storage batteries. The Gerrard exchange power plant consists of eleven cells with a normal discharge rate of 469 amperes with an additional four cells for raising the voltage to 30 in order to operate the subscribers' call registers. The motor generators are 37½ H.P. type and have an output of 800 amperes.

Mr. Poulsen on Wireless Telephone and Telegraphy. 143.—4-23-08. In an excellently illustrated paper read before the Royal Institution in London, Mr. Poulsen explained how he had successfully telephoned for a distance of 200 miles. He succeeded in telephoning a tune to a distance of 290 miles and found that at a distance of 107 miles it was possible to recognize the human voice.

TELEPHONE COMPETITION.

THE following editorial is taken from the New Orleans Daily States, one of the leading southern newspapers. The writer is a believer in telephone competition and treats the matter in a sane and logical manner. The people of New Orleans will demand competition to free them from a monopoly and such editorials as the following will hurry this much to be desired effect:

In telephone matters, as in every other line of business, the best way to secure permanently low rates and good service is to permit competition. Of course, those who enjoy a monopoly in this line are not expected to concede the correctness of that assertion. They will tell how expensive and annoying it is to have two telephone systems in the same city, and how all who presume to dispute the Bell system's right to a monopoly are merely promoters and stock-jobbing schemers.

It is not at all difficult for the city to protect itself against impositions and it would be folly to grant a valuable public franchise without first providing against the possibility of such imposition. Provision should be made also, for the forfeiture of all the property and franchises of both companies in the event that either should purchase the other or should enter into any pooling of interests, understanding or agreement whereby competition is destroyed.

With regard to the expense and inconvenience of two systems, which are so strongly stressed in the arguments made by the advocates of monopoly, it may be said that these objections are more apparent than real. After enduring the burdens and impositions of a telephone monopoly for many years, as we have done, and after striving for regulation as we have striven ineffectively and long, almost every other city of any importance in the United States has reverted to competition as the only effective remedy. That there has been some duplication of telephones where competition prevails is admitted, but the statistics show these to be comparatively small, confined almost exclusively to certain lines of general business and to particular professions.

Whatever there may be of disadvantage in having two telephones in a business house is much more than offset by the advantages of a very much greater number of connections and of reduced rates, which in most instances reported, makes the two telephones about as cheap as one had been before. It is true that in a few isolated instances dissatisfaction has resulted from the experiments with the dual systems, and in every community there have been found individuals who oppose it. But the preponderance of testimony given by those who have investigated the matter is to the effect that cheaper rates, largely increased numbers of telephone subscribers and vastly improved service have been the results wherever competition has been introduced.

The ordinary subscriber does not need two telephones in his residence, and he does not have it, the statistics showing that about eighty-five per cent of the subscribers have one telephone, the duplications amounting to about fifteen per cent. The fact that New Orleans is one of the very few important cities in the country where competition is not in successful operation carries its own lesson with it, and the results we feel in excessive rates, inferior service and a running to the Federal Courts by the monopoly when measures of relief to the people are sought to be put into effect.

All of that will be stopped the moment competition comes into the field. Real competition can regulate these things much more effectively than legislatures, commissions or courts can do it, and for that reason competition is desirable. Monopoly is a detestable thing and New Orleans cannot afford to stand out alone among the great cities of the country as the Mecca of monopolies, the strangler of enterprise.

Besides there are other intensely practical reasons why another telephone system should be authorized. It will increase the number of revenue-producing and revenue-disturbing enterprises, it will add largely to the taxable wealth of New Orleans, and the construction of the plant will mean the expenditure of some $2,000,000 here during the next year or two for the purchase of material and for labor. It must not be overlooked that competition will also compel the Cumberland company at the same time to spend a large amount additional in bringing its plant up to the highest state of efficiency. The net result will therefore be not only better service, cheaper rates, and the putting of telephones within the reach of all; but while doing that it will also greatly increase the taxable wealth of the state, give employment to labor, and create business for the merchants.

In Denmark only the inter-provincial, the inter-communal and the international telephones are worked by the state, while the local telephones are worked by private limited companies, to which the state has granted concessions.

THE INDIANA TELEPHONE CONVENTION

A Report of the Meeting of the Indiana Independents at Indianapolis

By R. D. Fisher

THE third annual convention of the Indiana Independent Telephone Association held at the Claypool Hotel, Indianapolis, May 13 and 14, was the best attended and most enthusiastic of any previous meeting of the association. Many important questions of vital interest were discussed and action taken calculated to advance Independent telephony throughout the state. The forenoon of the first day was devoted to committee work and examining the splendid exhibits of the fifty or more supply men and manufacturers.

The meeting was called to order at 2 o'clock by the president, A. C. Lindemuth, who congratulated the association on the large attendance which he said manifested the keen interest the Independent telephone men are taking in the association.

Hon. Charles A. Bookwalter, mayor of Indianapolis, was introduced by President Lindemuth and welcomed the Independents to the city and incidentally reviewed the local situation in a manner which greatly pleased those present. Mayor Bookwalter said the recent agitation of a merger of the two systems in Indianapolis occasioned him to familiarize himself with the telephone business and that he was compelled to take sides against the merger and in favor of the Independents.

Mayor Bookwalter's attitude caught the favor of the convention and he was applauded heartily. This was indicative of the general hostile spirit of the state meeting against the latest maneuver of the Bell Telephone Company to crush or wipe out competition by trying to connect Independent telephone exchanges with the Bell system or accomplish the same result by consolidating telephone services.

President Lindemuth was next on the program and delivered his annual address, which appears in full in another part of this issue.

Secretary Chas. S. Norton made his annual report, reviewing in a measure the work and results of the year. The membership at the close of the fiscal year numbers 161 companies, a gain of six companies. The report stated that while membership of all the Independent companies are desirable, the questions about which Independents are most concerned pertains to better methods in the conduct of business, better rates and better service. That these problems are being successfully solved is evidenced by the fact that a number of our companies have advanced their rates during the year to a figure commeasurate with the amount and character of the service given. A number of companies have completely rebuilt and re-equipped their exchanges with the latest type of telephone apparatus, while a majority have quit taking on unprofitable business.

The application of the Indianapolis Telephone Company for increased rates and conditions necessary for the rebuilding and extension of its present exchange has been bitterly opposed but the indications at present seem very favorable for the company's obtaining relief by means of a new franchise. Continuing, the report stated that the New Long Distance Telephone Company, during the year, has extended new circuits to Ft. Wayne, Peru, Logansport and South Bend. Additional circuits are being installed between Indianapolis and Lafayette to relieve the congested condition of the toll line business from the northwestern portion of the state with the capital city. A second through circuit is also being installed in connection with the United States Telephone Company of Ohio, from Indianapolis to Dayton, Ohio.

After noting and describing a number of new exchanges constructed and equipped with the latest type of apparatus—two companies, the Richmond Home and the Rushville Co-operative—with automatic systems, the report stated, that more money had been expended in betterments and extensions than during any previous year of the business.

Each of the eleven districts into which the state is divided held two or more meetings during the year—all of which were well attended and productive of good results by the exchange of ideas, experiences and the discussion of questions of interest and importance to the telephone business and management.

Financially the association is in excellent condition. All claims and expenses for the year have been met and a healthy balance remains in the treasury.

The report dwelt upon the necessity of a clearing house for the state and of the steps taken toward the establishment of such a service.

The report concluded by stating that the work during the year has been quite harmonious in all departments of the association and that closer attention is given to the items of income and expense, and that companies are less inclined to take on unprofitable business.

Secretary Norton said that the overtures which have been made to the Independents by the opposition clearly indicate that it at last realizes that the people are determined to exercise control over the telephone business, and that it is folly to fight the principle of each community owning and operating its telephone system in its own way.

Both President Lindemuth's annual address and Secretary Norton's report were well received.

The reports of the district vice-presidents elicited keen interest and on the whole were exceedingly gratifying. In addition to showing the improvements made, new companies admitted, extensions installed, troubles encountered, they showed the number of Independent telephones in use as compared with the number of Bell telephones. Some districts reported an Independent telephone in use for every ten persons in the district, others a telephone for every eight persons and two counties—Hendricks and Hancock—a telephone for every six persons in the county. An average of nearly 1,800 telephones were added in each of the eleven districts in the state during the year. The reports show that in every district the toll line business is assuming a high state of development. Several vice-presidents stated that while the financial flurry had not affected the telephone business at all, however, the stringency has been a good scare and possibly conducive to greater economy.

The smoker provided for the evening entertainment of the first day's convention, was converted into a theater party, and as the guests of the New Long Distance Telephone Company, over 300 telephone men, supply men and friends, in attendance upon the convention, attended the opera.

THURSDAY.

The first address on the morning program was made by J. B. Ware on "The International Association and Its Work." Secretary Ware said that in pointing out the bene-

ficial effects of the Independent telephone movement, it is only necessary to recall that in 1887 the average telephone cost was $41.88 for the country; while to-day it is a fraction less than $25. "To-day," he said, "we have more than 200,000 telephone subscribers on Independent telephone lines in Indiana alone, and practically every one of them has metallic connection and long-distance service over the state and into adjoining and distant states. Look back only to 1895, when according to the official report of the Bell company for that year, there were only 63 long-distance telephones in Indiana having metallic circuit lines. There are to-day more Independent telephones in Indiana alone than there were total telephones in the entire country as recently as 1890. In consideration of this wonderful development, and the material reduction in the cost of service to the people of the state and the country, who has the nerve to suggest that competition has not been a good thing for the country in the past? And in the light of the past who can truthfully declare that competition is not a good principle to-day?"

Mr. Ware spoke of the work of the International Association, paid a high tribute to Mr. Lindemuth as president and concluded by warning the Indiana Independents against monopoly and made a strong plea for loyalty to the Independent manufacturer. He also advised in an earnest manner against Independent companies making physical connections with the Bell lines and service.

Mr. Ware's address was listened to with interest and brought out universal applause.

F. L. Beam, president of the Ohio association, was present, and upon being introduced by President Lindemuth, addressed the convention briefly. Mr. Beam said he had often read in the hostile press that Indiana had gone over to the Bell, but since listening to the district reports he would no longer fear any such calamity. Mr. Beam congratulated the association upon the large attendance and interest manifested. He spoke of the progress being made in Ohio and specially dwelt upon the benefits derived from the attendance upon their meetings by the stockholders and investors.

"Legal Impediments to Consolidation," was the subject assigned to M. L. Clawson, of the Indianapolis bar.

The committee on resolutions reported adversely on a proposition introduced the first day of the meeting to ask the legislature to enact a law creating a State Telephone Commission to regulate the business of telephony in the state, equalize and establish rates, etc.

The committee recommended the appointment of a committee with John W. Coffey, of Indianapolis as chairman, to formulate a plan for the immediate establishment of a clearing house, through which all toll line and other settlements between companies may be made.

The election of officers resulted in the selection of Charles S. Norton of Indianapolis, president and A. J. Payton of Rockport, secretary.

About fifty manufacturers and supply houses were present and made a very creditable exhibition of telephone apparatus. This exhibition and the intelligent and courteous manner in which the experts in charge demonstrated the working of the improved instruments formed a very interesting and profitable feature of the convention.

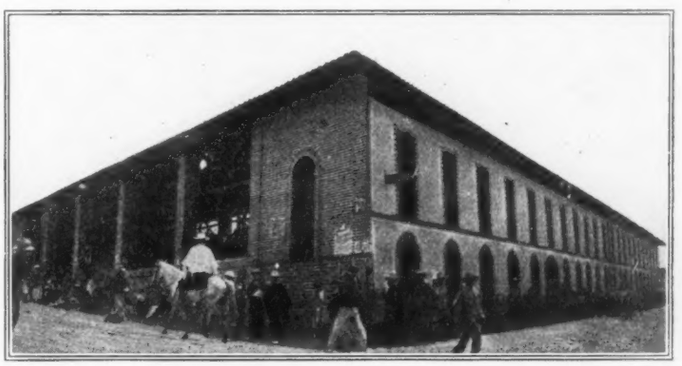
THE ILLINOIS CONVENTION.

THE fourth annual convention of the Illinois Independent Telephone Association was held in the Elks' Hall, Champaign, May 26, 27 and 28. The executive committee issued a very attractive official program and announcement of the meeting. Papers and addresses were read by L. F. Hyneman of Lexington, F. C. Woods of Galesburg, L. A. Herrick of Freeport, G. R. Spitler of Mount Zion, H. H. Bratt of Davenport, A. F. Loehr of Carlinville, W. H. Thill of Des Moines, James H. Shoemaker of Waterloo, E. J. Clapp of Newton, A. C. Lindemuth, president of the International Association, W. H. Bassett of St. Louis, Professor Morgan Brooks of the University of Illinois and others.

An inspection of the University of Illinois was an attractive feature of the program, following which was an evening devoted to entertainment and sociability. The program of amusement contained some very promising musical and recitational numbers.

A NEW SOUTH AMERICAN EXCHANGE.

CONSIDERABLE interest is manifested in new telephone work in South America, many believing that a promising field will soon be opened in the sister republic for American apparatus and supplies. H. C. Prado who recently returned to his home in South America after an eight-year absence in the states, sends TELEPHONY a photograph of the Edificio del Mercado at Cali and advises an exchange of 30 instruments will be constructed in Cali in the near future. Full information may be had by addressing the postmaster.



Cali-Edificio del Mercado.

TEN TELEPHONE COMMANDMENTS.

GEORGE W. CHRISTIE, of Long Prairie, Minnesota, sends TELEPHONY a list of ten commandments which he has compiled for the use of telephone subscribers. They follow:

1. Thou shalt call by number only.
2. Thou shalt always answer thy telephone at the first sound of the bell.
3. Thou shalt not use thy telephone when the lightning cracks in the sky, for verily I say thou endangerest thyself and will not be answered.
4. When the operator says, "Shake up your transmitter" thou shalt shake even if it givest thee paralysis.
5. Thou shalt not call again directly after ringing off else the operator deem it a ring-off and not answer.
6. Thou shalt not expect to get a party in another town directly after calling, for the line may be busy or the party not to be found.
7. Always shalt thou ring off when through speaking, for it will save confusion all around.
8. Thou shalt not rave and cuss at the operator if he does not answer on the dot, for he is busy and will attend to thy wants as soon as possible.
9. Never shalt thou flirt with the operator nor force her to converse with thee for it doth impair the service.
10. Above all never shalt thou get huffy and lose thy temper but be thou courteous and pleasant voiced, and remember especially that thine is not the only wire in the cable.

The chamber of commerce of Havana, Cuba, does not recognize the telephone business as a "natural monopoly," and advocates legislation favorable to competition.

LEGAL TELEPHONE CITATIONS

A Resume of Telephone Decisions Handed Down by the Courts.

By G. W. Hand

[Concluding Installment.]

Electric wire found dangling across street some evidence of.
Linton v. Weymouth Light & Power Company, 74 N. E. 321; TELEPHONY, 10-3-215.

Injury to lineman—defective construction disclosed by effect of storm—liability under such circumstances.
Smith v. M. & K. Telephone Company, 87 S. W. 71; TELEPHONY, 10-3-216.

Employe became frightened—ran and was injured—fellow servant rule in Washington—contributory negligence.
Sandquist v. Independent Telephone Company, 80 Pacific 539; TELEPHONY, 10-3-216.

Duty of company to erect guards in crossing over electric light wires—accidents due to storm of unusual severity.
Heidt v. Southern Telephone & Telegraph Company et al, 50 S. E. 361; TELEPHONY, 10-3-216.

Injury from falling over pile of stones placed on sidewalk.
White v. Keystone Telephone Company, 60 A. 998; TELEPHONY, 10-4-284.

Injury from dull pike pole which was originally furnished in good condition.
Thorne v. United Gas & Power Company, 81 Pac. 124; TELEPHONY, 10-5-354.

What is a sufficient inspection in Michigan?
Warren v. City Electric Company, 12 Detroit Legal News, 415; TELEPHONY, 10-5-354.

No liability on part of railroad for permitting telephone poles to remain near former—poles being on land of another over which railroad had no control.
Chattanooga Electric Railway Company v. Moore, 82 S. W. 478; TELEPHONY, 10-6-419.

Strike of employes will not excuse negligence of a company in permitting a wire to remain in dangerous place during strike.
Cleary v. St. Louis Transit Company, 83 S. W. 1029; TELEPHONY, 9-3-254.

Injury to lineman.
Barto v. Iowa Telephone Company, 101 N. W. 876; TELEPHONY, 9-3-254.

Negligence:

Obstructions—sagging wire—near sidewalk.
Southern Bell Telephone & Telegraph Company v. Howell. 53 S. E. 577; TELEPHONY, 12-2-107.

Proof that telephone instrument contained deadly charge of electricity cast burden on company of showing that it was not negligent.
Delahunt v. United Telephone & Telegraph Company, 64 A. 515; TELEPHONY, 12-5-291.

Injury to lineman—defective pole when first put in ground, company held liable.
Livingway v. Houghton County Street Railway Company, 108 N. W. 662; TELEPHONY, 12-4-239.

Injury from blunted pike poles—company only bound to furnish small tools in reasonably fit condition—if same become worn by wear servant takes responsibility if he uses them.
Towne v. United Electric Gas & Power Company, 70 L. R. A. 214; TELEPHONY, 12-2-106.

Proximate cause of injury—North Carolina.
Harton v. Forest City Telephone Company, 54 S. E. 299; TELEPHONY, 12-3-181.

Company had no notice of defect hence no liability.
Martin v. Citizens' General Electric Company, 92 S. W. 546; TELEPHONY, 12-1-49.

Wires from wooden building over electric wires—building burned and electric current conveyed over dangling telephone wires and resulting injury—telephone company liable.
Horning v. Hudson River Telephone Company, 97 N. Y. Supp. 625; TELEPHONY, 12-5-291.

Presence of dangling wires not enough to create liability.
Jones v. Union Railway Company, 98 N. Y. S. 757; TELEPHONY, 12-4-238.

Leaving telephone wire in contact with electric light wires—respective duties of municipality and company.
Fox v. Village of Manchester et al, 75 N. E. 1116; TELEPHONY, 11-3-148.

Contract to deliver at Court not a contract to deliver to addressee absolutely.
Cumberland Telephone & Telegraph Company v. Atherton, 91 S. W. 257; TELEPHONY, 11-6-399.

Injury from lightning—every one is charged with notice of the dangers of its being carried over wires.
Owen v. Portage Telephone Company, 105 N. Y. 942; TELEPHONY, 11-5-300.

Death from electricity—care as to third persons lawfully on premises.
Ryan v. St. Louis Transit Company, 89 S. W. 865; TELEPHONY, 11-3-148.

Who are fellow servants as distinguished from vice-principals.
Hollaway v. Bell Telephone Company, 93 S. S. 262 (Mo.); TELEPHONY, 12-3-180.

Injury from guy being placed too near alley.
Louisville Home Telephone Company v. Gasper, 93 S. W. 1057; TELEPHONY, 13-1-41.

Injury from sagging wires—presumption of negligence and how it may be rebutted.
Jacks v. Reeves, 95 S. W. 781; TELEPHONY, 13-2-112.

Risks of telephone operator—she assumes the ordinary risks—what are extraordinary?
Cahill v. New Eng. Telegraph & Telephone Company, 70 N. E. 821; TELEPHONY, 13-3-160.

Contributory, to touch sagging wire with piece of metal while former emits sparks
Citizens' Telephone Company v. Westcott's Admx, 99 S. W. 1153; TELEPHONY, 13-5-302.

Person telephoning injured by electric shock—instrument in good order—no liability.
Brucker v. Gainsboro Telephone Company—100 S. W. 240; TELEPHONY, 13-6-388.

Telephone lineman foreman knew of danger, failed to warn lineman who was injured from current from electric light company's wires—liability against foreman's company.
Postal Telegraph Cable Company v. Likes, 80 N. E. 140; TELEPHONY, 13-6-388.

It is, to allow wire to dangle over electric light wire if former is allowed to remain.
Citizens' Telephone Company v. Thomas, 99 S. W. 882.

It is negligence *per se* to place wires less than the statutory distance from the ground.
Chant v. Clinton Telephone Company, 110 N. W. 423; TELEPHONY, 14-1-10.

Duty to keep wires off streets is not assignable—company having duty will be held liable.
Citizens' Telephone Company v. Thomas, 99 S. W. 879; TELEPHONY, 14-2-71.

Proximity of wires—risk assumed unless hidden.
Drown v. New England Telephone Company et al., 66 A. 801; TELEPHONY, 14-2-71.

Failure of Company to transmit over connecting company's line.
Sabine Valley Telephone Company v. Oliver, 102 S. W. 925; TELEPHONY, 14-3-175.

It is, to permit electric wires carrying heavy current to remain uninsulated—Texas Rule.
San Antonio Company v. Badders et al., 103 S. W. 329; TELEPHONY, 14-3-176.

In digging pole holes company injured spring of water and held liable for damages.
Little v. American Telegraph & Telephone Company, 67 A. 168; TELEPHONY, 14-3-176.

Settlement from electric company "in full payment of all claims of the undersigned," barred action against telephone company.
Snyder v. Mutual Telephone Company, 112 N. W. 776; TELEPHONY, 14-4-330.

Duty to its own employes extends to persons in employ of contractor working on lines.
Smith v. Twin City Transit Company et al., 1012 N. W. 1001; TELEPHONY, 14-4-231.

Discussion of question of "due care."
Gloucester Electric Company v. Dover, 153 F. 139; TELEPHONY, 15-5-307.

High potential wires strung near low potential wires.
Grimm v. Omaha Electric Company, 112 N. W. 620; TELEPHONY, 14-5-307.
Massachusetts statute provides for notice of time, place and manner of injury.
Cahill v. New England Telephone & Telegraph Co., 79 N. E. 821; TELEPHONY, 14-5-307.
Necessity of inspection of poles and wires in Pennsylvania.
Combs v. Delaware & Atlantic Company, 67 A. 751; TELEPHONY, 14-6-348.

Notice: Notice to agent is notice to corporation.
Baries v. Louisville Electric Light Company, 85 S. E. 1186; TELEPHONY, 10-1-72.

Officers: Powers of an acting president.
Fernald v. Spokane & British Columbia Telephone & Telegraph Company, 72 Pac. 462; TELEPHONY, 6-1-30.
Sufficiency of service of process on officer in Georgia.
Southern Bell Telegraph & Telephone Company v. Parker, 47 S. E. 194; TELEPHONY, 8-2-123.

Ordinances: Failure to comply with—injunction—location of poles.
New Castle v. Central District & Printing Telegraph Company (Pa.); TELEPHONY, 7-4-248.

Operation: Duty to establish guard wires.
McKay v. Southern Bell Telephone Company, 31 L. R. A. 42-3; United Electric Railway Company v. Shelton, 89 Tenn. 423.
Duty of company to keep lines in good repair and if authorities refuse permission to make repairs company has authority to compel by legal proceedings.
United States Illuminating Company v. Grant, 65 Hun.

Patents: Exclusive contracts not upheld by patent laws.
Commercial Union Telephone Company v. New England Telephone Company, 61 Vt. 241; 15 A. S. R. 893; Minnesota v. Illinois, 94 United States 113.
Effect of non-payment of costs in patent suits.
(N. Y.) 222; 3 American Electrical Cases 95.

Ownership: May be by private individual in Indiana.
Magee v. Overshiner, 150 Ind. 427.
Kellogg Switchboard & Supply Company v. Glenn Telephone Company, 121 Fed. 144.
Self restoring drop patent suit.
United States Circuit Court of Appeals, American Telephone Journal, 9-17-26.

Personal Injuries: Superintendent while installing armature is a fellow servant of repair man while working on wire—damages.
Williams v. North Wisconsin Lumber Company, et al., 102 N. W., 589.
Defective insulation—electrically conveyed over telephone wire—injuries therefrom.
Parsons v. Charleston Consolidated Railway, Gas & Electric Company, 48 S. E. 284; TELEPHONY, 8-4-329.
Tripping over wires.
Smith v. Gilreath, 48 S. E. 262; TELEPHONY, 8-4-329.
Two underlying principles in every personal injury case.
81 N. Y. S. 1085; TELEPHONY, 6-2-88.
Proximate cause.
Georgetown Telephone Company v. McCullough's Admr., 80 S. W. 782.
Discussion of contributory negligence.
Columbus Railway Company v. Dorsey (Ga.) 46 S. E. 635.
Persons injured by falling brick—remote to proximate cause.
Leeds v. New York Telephone Company, 80 N. Y. S. 114; 70 N. E. 219.
Deceased killed in electric storm in metal proof shed where he had sought shelter—lightning struck pole distant 600 yards and was carried to shed by wire negligently attached to house—held no liability because company owed deceased no duty.
Martin's Admr. v. Cumberland Telegraph & Telephone Company, 76 S. W. 394.
Crossarm in which there was a defect when purchased covered with paint—not negligence to use.
Maryland Telephone & Telegraph Company, 55 A. 81.
Negligence of company a question for the jury where storm caused sagging of wire into which plaintiff's wagon ran.
Friesenham v. Michigan Telephone Company, 96 N. W. 501.
Injury to lineman from pole falling due to "dry rot"—duty to inspect poles—plaintiff not bound to use highest degree of care.
Walsh v. N. Y. & I. C. Company, 80 N. Y. Supp. 767.
Death caused by falling pole—contributory negligence.
Keyes v. Valley Telephone Company (M.), 93 N. W. 623.
Lineman killed by falling pole—contributory negligence.
Leach v. Central New York Telephone & Telegraph Company, 80 N. Y. Supp. 1037.
Lineman injured by falling from pole.
Black v. Rocky Mountain Bell Telephone Company, 73 Pac. 514.
Injury to lineman—joint wrong doers separately liable.
Cumberland Telephone & Telegraph Company, 74 S. W. 89.
Companies liable to persons traveling in highway where injuries are due to poles in street if plaintiff exercised due care.
Jeremiah Riley v. New England Telephone & Telegraph Company, 68 N. E. 17.
Helping fellow employe out of danger.
Whitworth v. Shreveport Belt Railway, 36 South. 414; TELEPHONY, 8-2-122.

Pleading and Practice: Ejectment lies to force vacation of highway—suit in equity not proper.
Little v. Company, 89 N. Y. S. 136.
In Iowa suit may be brought against company in any county through which its lines run.
Franklin v. North Western Telephone Company, 69 Iowa 97; 28 N. W. 461.
Pleading general issue in Tennessee in negligence case.
Cumberland, Etc., Company v. Floyd, 79 S. W. 795.
Agreement that pleading filed on second day of term might be filed as of the first, held void for lack of consideration; return of service good, although defendant incorrectly named—punitive and nominal damages.
Southern Bell Telephone & Telegraph Company v. Earle, 45 S. E. 319.
In New York as to taking appeal.
Miller v. Black River Telephone Company, N. Y. S., American Telephone Journal, 9-6-89.
Recovery only on claimed negligence as alleged in petition.
Politowitz v. Citizens' Telephone Company, 90 S. W. 1031; TELEPHONY, 11-5-300.

Poles and Wires: Interference with poles by land owner—company had no authority to place because no injunction could insure against removal.
Heck v. Greenwood Telephone Company, 73 N. E 960; TELEPHONY, 10-2-175.
Erecting on lands of another without authority—order to remove them.
Purdam v. Cumberland Telephone & Telegraph Company, 87 S. W. 1071; TELEPHONY, 10-3-215.
Erecting on lands of tenants in common under permit in writing from one of co-tenants, valid authority.
Mason v. Postal Telegraph Cable Company, 50 S. E. 782; TELEPHONY, 10-3-215.
License tax on in Pennsylvania—valid where purpose is to raise money for police inspection.
Schellsburg v. Western Union Telegraph Co., 26 Pa. Supreme Court 343; TELEPHONY, 10-6-419.
City's right to move poles in Missouri.
City of Hannibal v. Missouri & Kansas Telephone Company, 31 Mo. App. 23.
Must be sightly and neat.
Forsyth v. Baltimore & Ohio Telephone Company, 12 Mo. App. 494.
Location of, prescribed by commissioners.
American Telephone Journal.
Location of, prescribed by commissioners.
American Telephone & Telegraph Company v. Harbor Creek Twp., 23 Pa. Supreme Court 437.
Right to construct poles and wires "over and along" premises does not mean "across" them.
Zimmerman v. American Telephone & Telegraph Company, 51 S. E. 243; TELEPHONY, 11-4-214.
Former too near highway—dangers therefrom—liability of company.
Little v. Central District & Printing Telegraph Company, 62 A. 848; TELEPHONY, 11-5-311.
Poles and wires on land notice to buyer that owner of them has right to use the property.
Denton v. Cumberland Telephone & Telegraph Company, 96 S. W. 1112; TELEPHONY, 13-1-41.
Location of.
Am. T. & T. C. v. Harbor Creek Twp., 23 Pa. Supreme Court 437.
Injunction to restrain placing on abutting highway without authority.
Burrell v. Am. Telephone & Telegraph Company, 79 N. E. 705; TELEPHONY, 13-3-161.
Damages for placing poles and wires on—rule in Georgia.
Postal Telegraph-Cable Company v. Keehnan, 55 S. E. 067; TELEPHONY, 13-3-161.
Malicious injury to, in Missouri constitutes a felony.
State v. McKee et al., 104 S. W. 486; TELEPHONY, 14-6-349.
Wires of electric light company and those of telephone company must be kept a reasonable distance apart.
Simmons v. Shreveport Gas Electric Light Company, Let. and the Shreveport Telephone Company, 41 Southern 248; TELEPHONY, 12-4-239.

Village Streets: Use by company.
The use of streets for the erection of a telephone system with permission of village trustees, though without consent of abutting owners, is not unlawful.
Johnson v. New York & Pennsylvania Telephone & Telegraph Company, 78 New York Supplement 598.

Use of Streets: Distinction between rural highways and city streets—easement greater in latter.
Weeks v. New York & New Jersey Telephone Company, 83 New York Supplement 678.
Location of, must be reasonable.
36 Federal 164.
In highway—regulation of by commissioners—discretion and abuse of.
American Telegraph & Telephone Company v. Harborcreek Township, 23 Pa. Super. Ct. 437; TELEPHONY, 8-1-19
Not entitled to damages for time lost in trying to get company to remove pole.
Southwestern Telegraph & Telephone Company v. Whiteman, 81 S. W. 76; TELEPHONY, 8-2-122.
Too near highway—injuries—damages.
Alice Wade City & C. C. Telephone Company v. Billingsley, 77 S. W. 255; TELEPHONY, 8-3-226.
When an individual can complain of location of poles.
12 Missouri Appeal 485; TELEPHONY, 8-3-226.
Duty to remove fallen.
West Kentucky Telephone Company v. Phais, 78 S. W. 917; TELEPHONY, 8-3-225.
Colorado companies do not owe linemen duty to inspect.
Kellogg v. Denver Tramway Company, 72 Pac. 609; TELEPHONY, 6-3-161.
Right to place on railroad right of way in Louisiana.
Southwestern Telephone Company v. Kansas City S. & G. Railway Company, 33 South. 910; TELEPHONY, 5-6-336.
Company not absolute insurer of their safety.
Ward v. Telegraph Company, 1 American Electrical Cases 259.
Duty to inspect rests on company—personal injury.
Cumberland Telephone & Telegraph Company v. Bills, 128 Fed. 272.
Proper location of—must not be in dangerous position.
Alice Wade City, Etc., Company v. Billingsley, 77 S. W. 225.
Right to erect on New York streets.
New Union Telephone Company v. Marsh, 89 N. Y. S. 79; 96 App. Div. 122; TELEPHONY, 9-1-34.

Principal and Agent: Agent of company who collected and presented accounts has authority to bind company by his admissions.
Texas Company v. Prince, 82 S. W. 327.
Who competent to receive service of process.
Southern Bell Company v. Parker, 47 S. E. 194.

Public Policy: Monopoly of telephone business is against public policy.
American Telephone & Telegraph Company v. Morgan County Telephone Company, 36 South. 178; TELEPHONY, 8-2-121.
Contract giving company exclusive right to place telephones in certain place held void as against.
Central New York Telephone & Telegraph Company v. Averill et al., 105 N. Y. S. 378; TELEPHONY, 14-4-230.

Rates: Those fixed by ordinance could not be changed by company.
Charles Simons' Sons Company v. Maryland Telephone & Telegraph Company, 57 A. 193; TELEPHONY, 7-6-438.
Authority to fix rates, where it must be found.
TELEPHONY, 9-4-342; St. Louis v. Bell Telephone Company, 96 Mo. 623; Central Union Telephone Company v. Bradbury, 106 Ind. 1; Johnson v. Indiana, 113 Ind. 143; Central Union Telephone Company v. State, 118 Ind. 144.
Right to "control use of streets" and to "license, tax and regulate" telephone companies does not confer power to regulate rates.
2 American Electrical Cases; Joyce, Electric Law, p. 525.
Rates cannot be fixed or passed upon by state court when company is in the hands of a receiver appointed by Federal Court (M.).
Rogers v. Chippewa Circuit Judge, 10 Detroit Legal News 689.
May be regulated by Legislature notwithstanding patented quality of instruments.
Hackett v. State, 105 Ind. 250; Central Company v. Bradbury, 106 Ind. 1; Johnson v. State, 113 Ind. 143; and 118 Ind. 1.
Quality of service maximum rate provided by Legislature requires.
5 N. E. 721; Joyce, Electric Law, p. 523.
Right to regulate on the part of cities.
American Telephone Journal, 10-20-332.
Franchise prescribed rate, which company tried to raise; held that city had no power to set a price on telephone service.
Marklin v. Findlay Home Telephone Company; American Telephone Journal, 7-24-379.
Adjustment of by Probate Court in Ohio. No contract right, writ of ouster denied.
State v. Toledo Home Company, 74 N. E. 162.
Regulation of by municipalities to be valid must come from Legislature.
TELEPHONY, 10-3-215.
Authority to regulate rates of service in Ohio must come from the Legislature.
Farmer & Getz v. Columbiana County Telephone Company, 74 N. E. 1078; TELEPHONY, 10-4-283.
In New York it comes from the Legislature.
Wright v. Glen Telephone Company, 99 N. Y. S. 85; TELEPHONY, 12-2-106.
Maximum rate for city service does not preclude a higher rate for combination city and country service—Kentucky.
Moberly v. Richmond Telephone Company, 103 S. W. 714; TELEPHONY, 14-3-176.

Real Property: Exception or reservation.
Myers v. Bell Telephone Company, 82 N. Y. S. 83.
Telephone system is real property.
Regina v. North Staffordshire Railway Company, 31 El. & Eh. 392; American Union Telephone Company v. Middleton, 80 N. Y. 408; N. Y.. Ont & Wes. Railway Company v. Western Union Company, 36 Hun. (N. Y. 205; Boston Safe Deposit & Trust Company v. Telephone Company, 36 Fed. 288; Western Union Company v. State, 9 Baxt. (Tenn.) 509; Shelbyville Water Company v. People, 140 Ills. 545; Badge Lbr. Company v. Light & Power Company (Kan.), 92 Pac. 476; Frechet v. Drake (Ariz.), 12 Pac. 694.

Right of Way: Grant for, not binding where signature, though genuine, was obtained by misrepresentation.
Wilcox v. American Telephone & Telegraph Company, 68 N. E. 153.
Use of railroad for, in Arkansas.
St. Louis, Iron Mountain & Southern Railway Company v. Batesville & Winona Telephone Company, 97 S. W. 660; TELEPHONY, 13-2-113.
Destruction of line by railway.
TELEPHONY, 13-3-161.
Contract for construed.
TELEPHONY, 13-2-113.

Regulations: Regulation and operation—jurisdiction—obstruction of roads in Kentucky—Circuit Court has jurisdiction over such matters.
Commonwealth v. American Telegraph & Telephone Company, 84 S. W. 519; TELEPHONY, 9-5-422.
Discrimination—punitive damages could not be collected where there was no malice.
Cumberland Telegraph & Telephone Company v. Baker, 37 South. 1012; TELEPHONY, 9-5-422.
Rules and regulations—discrimination—collections of rentals—set off of debt by subscriber not allowed against company.
Irwin v. Rushville Co-operative Telephone Company, 69 N. E. 258; TELEPHONY, 7-4-251.
Jurisdiction of municipality in city streets.
City of Plattsburg v. People's Telephone Company, 8 Mo. App. 306; TELEPHONY, 6-2-89.
When rules are necessary.
Kapella v. Nichols Chemical Company, 82 N. Y. Supp. 477; TELEPHONY, 6-2-89.
Rental could not be collected for time telephone was out of repair, neither could service be discontinued for failure to pay rental.
Mo. State v. Kinloch Telephone Company, 67 S. W. 684.
Authority of subscriber to use extension set.
Gardner v. Providence Telephone Company (R. I.), 49 A. 1004.
Subscriber who offered pay for rental in unpaid labor claims could not complain if telephone was taken out.
Irwin v. Rushville Co-operative Telephone Company, 69 N. E. 258.
Rule of company that it does not deliver messages and that any one who assists in making connections is agent of patron does not relieve company from liability for failure to send messenger.
Central Company v. Swoveland, 14 And. App. 341.
Subscriber who refuses to pay his bill cannot complain if his telephone is taken out.
Telegraph Company v. McGwin, 104 Ind. 130; 2 N. E. 201; Water Company v. Wolfe, 41 S. W. 1040; Frothingham v. Benson, 44 N. Y. S. 879; Brass v. Rathbone, 47 N. E. 905; Rushville Company v. Irwin, 59 N. E. 327.
Rule invalid that company is not liable for mistakes of messengers sent out by it—rule valid that company will not

transmit messages beyond telephone station—rule valid that company will not call persons who are an unreasonable distance from telephone station—in toll line business messengers must be employed—duty as common carrier.
Central Union Telephone Company v. Swoveland, 42 N. E. 1035; 6 American Electrical Cases 679.

Rule that service will be discontinued for failure to pay rental is reasonable.
Rushville Co-operative Telephone Company v. Irwin, 59 N. E. 327.

Reasonable regulations in Kentucky.
Williams v. Maysville Telephone Company, 82 S. W. 995; TELEPHONY, 9-2-160.

Company cannot be forced to place telephone in pool room.
TELEPHONY, 9-2-161.

Authority of Probate Courts in matter of regulation of companies in Ohio.
Queen City Telephone Company v. City of Cincinnati, 76 N. E. 392; TELEPHONY, 11-4-215.

Oregon rule—when they are necessary.
Blust v. Pacific Telephone Company; TELEPHONY, 12-1-49.

It is reasonable to require deposit of coin so that operator can hear the ring.
TELEPHONY, 13-6-389.

Company must not require one subscriber to go to Central Office and pay toll charge in advance unless all are required to do so.
Yancey v. Batesville Telephone Company et al., 99 S. W. 679; TELEPHONY, 14-1-11.

Designation of place to set poles and string wires—under it cannot be arbitrary to the extent of depriving company right to set their poles—rule must be reasonable.
TELEPHONY, 11-5-301.

What is "reasonable regulation" of use of streets by companies—restriction by municipality—Wisconsin.
State ex rel Wisconsin Metropolis Telephone Company v. City of Milwaukee et al., 113 N. W. 40; TELEPHONY, 14-6-348.

Service: Cannot be compelled to furnish, to house of ill repute.
Godwin v. Carolina Telegraph & Telephone Company (N. C.), 48 S. E. 636; TELEPHONY, 8-6-522.

Duty to furnish messenger service.
Central Union Company v. Swoveland, 42 N. E. 1035; TELEPHONY, 7-6-439.

Companies bound to furnish indiscriminately.
State ex rel, Payne et al. v. Kinloch Telephone Company, 67 S. W. 684; TELEPHONY, 8-2-122.

Wrongful discrimination.
Cumberland Telephone & Telegraph Company v. Hudson (Ky.), 71 S. W. 435; TELEPHONY, 5-3-156.

Service cannot be denied if regulations are complied with.
Mahan v. Michigan Telephone Company, 93 S. W. 629; TELEPHONY, 5-4-212.

No rebate of rental without notice of defective service.
Atlanta Standard Telephone Company v. Porter, 43 S. E. 441; TELEPHONY, 5-4-212.

Duty to furnish compelled by mandamus, notwithstanding a previous debt.
State v. Nebraska Telegraph Company, 22 N. W. 237.

Argument of motion for new trial over telephone.
TELEPHONY, 11-4-215.

Company cannot remove any telephone except that in which there is default in rent.
Cumberland Telegraph & Telephone Company v. Hobart, 42 S. 349; TELEPHONY, 13-2-112.

Streets and Highways: Abutting owner could not maintain action for removal of poles in.
Halleran v. Bell Telephone Company, 67 N. E. 1124; TELEPHONY, 8-3-225.

Right to use street in Montana—statutes giving authority.
State ex rel. Rocky Mountain Bell Telephone Company v. Mayor, Etc., Red Lodge et al., 76 Pac. 758; TELEPHONY, 8-1-18.

"Public roads" includes city streets in Iowa.
State v. Nebraska Telephone Company, 103 N. W. 120; TELEPHONY, 10-4-284.

Meaning of public highways in Nebraska.
Nebraska Telephone Company v. Western Independent Company et al., 95 N. W. 18; TELEPHONY, 6-2-87.

Right on highways in New York.
Myers v. Bell Telephone Company, 82 N. Y. 83; TELEPHONY,, 6-1-30.

Permit to occupy street not necessary.
Chamberlain v. Iowa Telephone Company, 93 S. W. 596; TELEPHONY, 5-4-212.

Use of village streets by companies.
Johnson v. New York & Pennsylvania Telephone Company, 78 N. Y. Supp. 598.

Rights of abutting owners.
Post v. Hudson River Telephone Company, 78 N. Y. Supp. 76.

Location of poles prescribed by commissioners.
American Telegraph & Telephone Company v. Harbor Creek Township, 23 Pa. Super Ct. 437.

City's right to move poles in Missouri.
City of Hannibal v. Missouri & Kansas Telephone Company, 31 Mo. App. 23.

If in, must be sightly and neat.
Forsyth v. Baltimore & Ohio Telephone Company, 12 Mo. App. 494.

Use of village streets by company—consent of village trustees to erection of telephone system, though without consent of abutting owner, is not unlawful.
Johnson v. New York & Pennsylvania Telephone & Telegraph Company, 78 N. Y. Supp. 598.

Distinction between rural highways and city streets.
Weeks v. New York & New Jersey Telephone Company, 83 N. Y. Supp. 678.

Poles may be erected in streets without consent of adjacent owner.
Magee v. Overshiner, 150 Ind. 127.

Use of, for twenty-one years by telephone company, even though under no franchise, gives permanent right therein.
City of Bradford v. New York & Pennsylvania Telephone & Telegraph Company, 56 A. 41.

Charter must confer right in express terms or by necessary implication.
Utica v. Utica Telephone Company, 48 N. Y. Supp. 916.

Poles are an additional burden in Ohio.
Smith v. Cent. Dist. Print. & Teleg. Company, 2 O. Cir. Ct. Rep. 259; 2 Am. Elec. Cases 237, 256; Dailey v. State, 5 Ohio 348; 5 Am. Elec. Cases 187; Joyce, Electric Law, Sec. 304; 1 Am. Elec. Cases 709; 83 N. Y. Supp. 678.

Authority to place poles on highway in Illinois.
Independent Telephone & Telegraph Company et al. of Towanda, 77 N. E. 456; TELEPHONY, 12-2-05.

Rights thereon in New York—companies liable for any substantial cutting of trees.
Osborne v. Auburn Telephone Company, 99 N. Y. S. 874; TELEPHONY, 12-1-48.

Right of competing company to question authority of another to use.
Merchants' Company v. Citizens' Telephone Company, 93 S. W. 642; TELEPHONY, 13-1-40.

Right of general control over, includes authority to levy tax for use of.
City of Memphis v. Postal Company, 145 F. 632; TELEPHONY, 13-2-112.

In village of one thousand, classed as rural highways in New York.
Powers v. State Line Telephone Company, 102 N. Y. S. 34; TELEPHONY, 14-1-10.

Agreement to pay per cent of gross earnings for privilege of occupying streets is binding in Missouri.
City of California v. Bunceton Telephone Company, 87 S. W. 604; TELEPHONY, 10-5-353.

The use of streets for the erection of a telephone system with permission of village trustees, though without consent of abutting owners, is not unlawful.
Johnson v. N. Y. & Penn. Telephone and Telegraph Company, 78 N. Y. Supp. 598.

Distinction between rural highways and city streets—easement greater in latter.
Weeks v. N. Y. & N. J. Telephone Company, 83 N. Y. Supp. 678.

Highway commissioners may fix location of poles in highway and change location when reasonably necessary.
American Telephone & Telegraph Company v. Harborcreek Township, 46 A. 140.

"Public roads" do not include "city streets."
Nebraska Telephone Company v. Western Indiana, Etc., Company, 95 N. W. 18.

Section of state constitution requiring companies to obtain permission from city councils before erecting lines along city streets is mandatory.
East Tennessee Telephone Company v. Anderson Co. Telephone Company, 74 S. W. 218.

Housemoving an unreasonable use of streets.
98 N. W. 706.

Rights on suburban streets in New York a disputed question.
Weeks v. New York & New Jersey Telephone Company, 83 N. Y. Supp. 678; TELEPHONY, 6-4-244.

Housemoving in.
North Western Telephone Exchange v. Anderson, 98 N. W. 706.

Regulation of use of streets.
City of Wichita v. Missouri & Kansas Telephone Company . (Kan.), 78 Pac. 886; TELEPHONY, 9-3-253.

Village streets—use of companies.

Castle v. Telephone Company, 6 New York Supplement, 482; Johnson v. New York & Pennsylvania Telephone Company, 78 New York Supplement, 598.

Agreement to pay per cent of gross earnings for privilege of occupying streets is binding in Missouri.
City of California v. Princeton Telephone Company, 87 S. W. 604; TELEPHONY, 10-5-353.

Statutes and Construction of Statutes: Failure to comply with provisions of statutes.
Cumberland Telephone & Telegraph Company v. Morgan's Louisiana & Texas R. & S. S. Company, 36 South, 352; TELEPHONY, 8-2-122.

Construction of: "Act providing for the *formation* of telephone companies"—meaning of formation.
City of Wichita v. Missouri & Kansas Telephone Company (Kan.), 78 Pac. 886; TELEPHONY, 9-3-253.

Distinction between rural highways and city streets.
Ganneth v. Independent Telephone Company, 106 N. Y. S. 3; TELEPHONY, 14-6-350.

Subways: Location of subways by board of public works not conclusive.
Western Union Telegraph Company v. Syracuse, 53 N. Y. Supp. 690.

Had no exclusive right to.
Empire Subway Company v. Broadway Company, 33 N. Y. Supp. 1055.

Taxation: Revenue tax on messages.
New York Telephone Company v. Treat, 130 Fed. 340; TELEPHONY, 8-3-225.

Under state laws when company existed under franchise of federal government.
Western Union Telegraph Company v. State of Missouri ex rel. Collector of Jackson County, 23 Supreme Court Reporter 730; TELEPHONY, 8-5-409.

License tax, when valid.
Postal Telegraph Cable Company v. Borough of New Hope, 191 U. S. 204; do v. Borough of Taylor, 191 U. S. 204, TELEPHONY, 7-4-248.

When license fees are legal.
Sunset Telephone & Telegraph Company v. City of Medford et al., 115 Fed. 202; TELEPHONY, 7-5-354.

Shares of stock, not tangible personal property, taxable in Iowa.
Layman v. Iowa Telephone Company, 99 N. W. 205; TELEPHONY, 8-1-19.

Assessment of omitted property.
Parkinson et al. v. Jasper County Telephone Company, 67 N. W. 471; TELEPHONY, 6-2-87.

Instruments used in interstate commerce not taxable.
State v. Rocky Mountain Bell Telephone Company, 71 Pac. 311; TELEPHONY, 5-4-212.

War revenue tax construed.
New York Telephone Company v. Treat, 130 Fed. 340.

Of tangible telephone property in Nebraska not unconstitutional as being in violation of interstate commerce.
97 N. W. 1063.

Iowa telephone tax law invalid.
Layman v. Iowa Telephone Company, 99 N. W. 205.

Reasonableness of tax on poles.
Postal Telegraph Company v. New Hope; do v. Taylor 5 Advance Opinion U. S. Supreme Court 205.

Power to reassess omitted property.
Parkinson v. Jasper County Telephone Company, 67 N. E. 471.

Realty on which exchange building stood was used in ordinary course of business and hence was taxable by state board.
New England Telephone & Telegraph Company v. City of Manchester, 55 A. 388.

License fee could not be imposed on company which had previously received a franchise from proper authority.
21 N. W. 828.

License tax on each pole declared valid.
St. Louis & Western Union Telegraph Company, 148 U. S. 92; do 149 U. S. 465.

License fees for use of streets—true test of validity of.
City of Fort Smith v. Hunt, 82 S. W. 163; TELEPHONY, 8-4-328.

Tax of $1 on every pole is valid.
St. Louis v. Western Union Telegraph Company, 148 United States, 92; 149 Iowa 465.

Validity of license fees on poles and wires in Tennessee, law upheld as being a police regulation.
City of Memphis v. Postal Telegraph Company, 145 Fed. 602; TELEPHONY, 12-5-291.

Specific and ad valorem on the same property.
Mayor of Nashville v. Cumberland Telephone & Telegraph Company, 145 Fed. 607; TELEPHONY, 12-5-291.

Constitutional provision for taxation on gross earnings of all telephone companies.
State v. Northwestern Telephone Exchange Company, 104 N. W. 1086; TELEPHONY, 11-4-215.

Telephone easements in tunnels held to be assessable as real estate.
People v. Upham, 77 N. E. 941; TELEPHONY, 13-1-41.

Assessment of telephone properties in Kentucky.
Commonwealth v. Cumberland Telephone & Telegraph Company, 99 S. W. 604; TELEPHONY, 14-1-11.

"Telegraph" includes "Telephone": Cases holding the affirmative of the above proposition:
State v. Central N. J. Telephone Company, 53 N. J. L. 341; Attorney General v. Edison Telephone Company, 6 Q. B. D. 244; Wisconsin Telephone Company v. City of Oshkosh, 62 Wis. 32; Chesapeake & Potomac Telegraph Company v. Baltimore & Ohio Company, 66 Md. 339; York Telephone Company v. Keesey, 5 Pa. Dist. R. 366; Franklin v. N. W. Telephone Company, 69 Iowa 9; Central Pennsylvania Telephone Company v. Wilkesbarre & U. S. Railway, 11 Pa. C. & R. 417; TELEPHONY, 9-2-159.

Same subject—negative of.
Home Telegraph Company v. Mayor et al of Nashville, 101 S. W. 770; TELEPHONY, 14-2-71.

Meaning of New Line of Telephone.
Cumberland Company v. Yazoo Ry. Company, 44 Southern 166; TELEPHONY, 14-3-175.

Text Books.
Law of Telegraphs and Telephones—Jones; TELEPHONY, 13-6-387.

Trees: Trimming of, in Michigan—companies have authority to do so to admit of free passage of wires.
Wyant v. Central Telephone Company, 123 M. 51; TELEPHONY, 8-6-521.

No previous notice to owner necessary before trimming.
123 M. 51.

Damages for injury to shade trees.
South Western Telegraph & Telephone Company v. Branham; TELEPHONY, 6-2-89.

No authority to cut shade trees without permission of owner.
McAntire v. Joplin Telephone Company, 75 Mo. App. 535; 1 Mo. App. Rep. 420; Brownson v. Albion Telephone Company (Neb.), 60 L. R. A. 426; Joyce, Electric Law, p. 390.

May be trimmed in a reasonable manner.
Meyer v. Standard Telephone Company (Iowa), 98 N. W. 300.

Trimming trees held lawful.
Southern Bell Telephone & Telegraph Company, 69 Fed 61.

Franchise gave no right to trim trees on private property.
South Western Telephone & Telegraph Company v. Branham (Tex.), 57 Am. Rep. 237.

Held that company was liable even for necessary injuries to.
Bronson v. Albion Telephone Company (Neb.), 60 L. R. A. 426.

Cutting of—rule in Missouri.
Betz v. Kansas City Company, 97 S. W. 207; TELEPHONY, 13-2-113.

Trespass: Damages for willful.
Jones v. Cumberland Telephone & Telegraph Company, 80 S. W. 165.

Damages.

For trespass in locating telephone pole in front of premises.
South Western Telegraph & Telephone Company v. Whiteman, 81 S. W. 76.

Attaching wires to roof of building without permission—reasonable rental value may be recovered.
Burke v. New York Telephone Company, 91 N. Y. Supp. 390; TELEPHONY, 10-1-72.

Wires: Cutting of, by house mover.
Northwestern Telephone Exchange Company v. Anderson; TELEPHONY, 7-5-354.

Guy wires—when necessary (Ill.).
Cumberland Telephone & Telegraph Company v. Coats, 100 Ill. App. 519; TELEPHONY, 6-2-89.

Location of wires in Minnesota.
Northwestern Telephone Exchange v. Twin City Telephone Company; TELEPHONY, 6-2-88.

Removal of by authorities—no such right in absence of interference.
American Union Telegraph Company v. Harrison, 1 American Electrical Case 291.

Conversion of—company liable for acts of linemen when.
Electric Power Company v. Company, 43 N. E. 986; 148 N. Y. 741.

Cutting of wires to allow moving of buildings in Massachusetts. Liability of parties.
Richards v. Boston Electric Light Company, 74 N. E. 350; TELEPHONY, 10-2-174.

THE INTERNATIONAL ASSOCIATION

Recent Notices Sent Out from the Association's Headquarters, Monadnock Building, Chicago.

By A. C. Lindemuth

DEVELOPMENT OPPORTUNITIES.

UNDER this head the International Independent Telephone Association will present in each issue of TELEPHONY opportunities brought to its attention for developing new territory which it believes would appeal to those seeking investment in the Independent field. In this way, it will endeavor to aid in development of new territory, thereby extending and strengthing the Independent telephone system, incidentally increasing the market for Independent telephone apparatus and supplies.

All persons having information of undeveloped territory, whether for toll lines or local exchanges, which would present attractive and practical investment and useful addition to the Independent telephone system will confer a favor upon the association by forwarding such information to the Chicago headquarters:.

WEST.

Good opportunity to establish a number of small exchanges with connecting farm and toll lines, in rich fruit country. Good demand for toll service, particularly among fruit growers and shippers. Number of well developed exchanges in surrounding country with toll lines who will connect and assist. Small investment only required.—Index No. 10.

SOUTH.

Opportunity to establish exchange in good sized city. Franchise can be secured without difficulty by reliable company. Splendid long distance field. Independent company at city of same size in vicinity has increased 100 per cent since organization. This company will be glad to assist in establishing new exchange and to afford facilities for long distance connections. Requires large investment and offers exceptional opportunity for firm of construction engineers, able to swing big deals.—Index No. 11.

NORTH.

Established company in good sized city needs new money for extended development. Franchise perpetual, fair rates, good toll business. A big proposition which will offer attractive returns with capable handling.—Index No. 12.

EAST.

New development in group of small cities and surrounding territory, in rich manufacturing section. Liberal franchises already secured, splendid opportunity for lucrative toll business.—Index No. 17.

All inquiries accompanied by proper references, will receive particulars as to locality and the persons with whom to correspond. Refer to index number. Address the Association.

THE companies named below have made settlement with the association for their stamp dues for the year 1908, the same being payable monthly in advance, thus securing to the organization a regular and assured income from those companies, and thereby relieving the association and operating companies, as well as the companies named, from a considerable amount of trouble and expense incident to the plan:

American Electric Telephone Company, Chicago.
Automatic Electric Company, Chicago.
Century Telephone Construction Company, Buffalo, N. Y.
Chicago Telephone Supply Company, Elkhart, Ind.
Dean Electric Company, Elyria, Ohio.
Illinois Electric Company, Chicago.
McGraw Publishing Company, New York, N. Y.
Monarch Telephone Manufacturing Company, Chicago.
National Carbon Company, Cleveland, Ohio.
North Electric Company, Cleveland, Ohio.
Sterling Electric Company, LaFayette, Ind.
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.
Swedish-American Telephone Company, Chicago.
Telephony Publishing Company, Chicago.
The Vote-Berger Company, LaCrosse, Wis.

For reasons satisfactory to the executive committee and the active officers of the association, the application of the stamp resolution adopted at the convention held in January last is waived as to the following:

John A. Roebling's Sons Company, Trenton, N. J.
American Steel & Wire Company, Chicago.
Monarch Electric & Wire Company, Chicago.
Standard Underground Cable Company, Pittsburg, Pa.

The following is a list of companies who are using the stamps on their invoices:

Acme Telephone Manufacturing Company, Albin, Iowa.
American Automatic Telephone Company, Urbana, Ohio.
B-R Electric & Telephone Manufacturing Co., Kansas City, Mo.
Blackburn, George R., Cleveland, Ohio.
Cadwell Cabinet Company, Jamestown, N. Y.
Carbolineum Wood Preserving Company, Milwaukee.
Chance Manufacturing Company, Centralia, Mo.
Cobb, H. E., Monadnock Block, Chicago
Coleman, C. J., Clarks Fork, Idaho.
Conover, W. George, Merchants' L. & T. Building, Chicago.
Cook, Frank B., Chicago.
Cracraft-Leich Electric Company, Genoa, Ill.
Curtis Sash & Door Company, Sioux City, Iowa.
Dearborn Electric Company, Chicago.
Durant Electric Supply Company, Chicago.
Doubleday-Hill Electric Company, Pittsburg, Pa.
Ericsson Telephone Manufacturing Company, L. M., Buffalo.
General Insulate & Machine Company, Brooklyn, N. Y.
Highland Electric Manufacturing Company, Connellsville, Pa.
Holtzer-Cabot Electric Company, Chicago.
Indiana Steel & Wire Company, Muncie, Ind.
Korsemeyer Company, Lincoln, Neb.
Long Distance Telephone Manufacturing Company, South Bend.
McCulloch & Moss Lumber Company, Minneapolis, Minn.
Metropolitan Electrical Supply Company, Chicago.
Nagel Electric Company, The W. C., Toledo, Ohio.
National Lumber & Creosoting Company, Texarkana, Ark.
National Pole Company, Escanaba, Mich.
Newgart & Co., Henry, Chicago.
Paducah Pole & Timber Company, Paducah, Ky.
Peirce Specialty Company, Elkhart, Ind.
Protective Electrical Supply Company, The, Fort Wayne, Ind.
Rock Island Battery Company, Cincinnati, Ohio.
Runzel-Lenz Electric Manufacturing Company, Sumter, S. C.
Sandwich Pole-Changer Company, Sandwich, Ill.
Simplex Electrical Company, Monadnock Block, Chicago.
Sterling & Sons Company, W. C., Monroe, Mich.
Sumter Telephone Manufacturing Company, Sumter, S. C.
Terry Company, T. B., Cedar Rapids, Iowa.
Texas Wood Preserving Company, Jefferson, Texas.
Torrey Cedar Company, Clintonville, Wis.
Transmitter, The, Weatherford, Texas.
Wire & Telephone Company of America, Rome, N. Y.
Wood (Harry I.) Company, Louisville, Ky.

In case of neglect on the part of any of these companies to use the stamps on their invoices, kindly remind them at once.

Copies of the trade-mark resolution and rubber stamps for marking your purchasing orders, and invoices returned for stamps, will be furnished free upon request to the Chicago headquarters.

Cut this list out and post it up on your desk. It tells who are aiding the association and the Independent cause.

The Inspector and The Troubleman

By A. E. Dobbs

[Third Installment.]

WILLIAM STUDIES STRATEGY.

"WILLIAM," said George, "I want you to see if you can not get permission to trim some of those trees on J street. You remember that one section there that is so bad? We have never been able to cut any limbs in one or two sections there, but present the case pretty strongly, and if you can't do anything else, try and get permission to trim the ends of the limbs off with a pocketknife, for the sight of a saw, hand ax or tree trimmer would scare those people so, they would be out and after you before you had time to ring the door bell. You may take a sharp hand ax, but keep it out of sight by putting it in your belt underneath your coat.

"You should also take along a ladder, for you must not mark the trees with your climbers, at least not till you get ten feet from the ground. If a man will let you trim his trees, be sure and do a neat job, and if he wants you to cut off other limbs on the same tree, or any other little trimming, do it for him to keep him in a good humor. You might also take along some paint and a brush, and paint the ends of the limbs you cut off. This makes them look better and keeps that part of the tree from decaying. If you don't happen to have any paint with you, you might have the man on the ground throw up a handful of mud, which you can plaster over the end of the stump.

"Do not cut off the ends of the limbs and leave those stubby ends sticking up, as I have known many linemen to do, if you can avoid it. Cut your limbs off close to the parent branch, for then it will not only give you no more trouble, but will make a neater appearance. Much of the prejudice of tree-owners against telephone lines is due to the careless, let-it-go-at-that way in which trees have been trimmed. Pick up a ground man somewhere, and make him carry away the brush to some out-of-the-way place. Many a time people will not notice that limbs have been cut, if they are promptly carried away."

Will started out, and by the use of much talk and diplomacy, succeeded in getting permission to do about all the trimming he wanted, though in one case he had to trim a tree all the way around in order to satisfy an owner for having one limb taken off, which Will with most ostentatious cheerfulness. But one tree had a limb sticking right up through the middle of about thirty wires, and the owner of it had the reputation of being a crank on that subject, but after some persuasion Will got permission to trim what he could cut off with a pocketknife. After cutting off several of the smaller limbs at the end of the branch, Will began to think what a pity it was that he could not take that whole limb off, and settle that trouble once for all.

"I think I'll deaden that limb," he said to himself, "for if I don't, I will have to do this again next year, and the year after, and the year after that. I will just "ring" that limb all the way around next to the trunk, so that it won't grow any more. I wish I had an auger and some sulphuric acid."

He proceeded to cut away the bark around the limb next to the trunk, and soon he had a white ring about four inches wide all around it.

"Now let me see. This tree is sour elm, and it dies hard. I guess I had better cut into that limb a little way to make sure of it."

The limb was about four inches in diameter at this place, and cutting it with a pocketknife was slow work, but Will kept on, and after a short time concluded that as he had cut it so far, he might just as well finish it, which he did. Finally when, after three-quarters of an hour, the limb fell, the owner put in an appearance, and, of course, was angry, but when Will reminded him of his agreement to use nothing but a pocketknife, the humor of the thing put him in a better frame of mind.

"Well," he said, as he looked at the limb to make sure Will was telling the truth, "you must have wanted that limb off pretty bad." Then he laughed. "Well, let it go at that. It is my treat, and the limb will hardly be missed anyhow."

One day George hired a lineman to do some repair work, and among other things directed him to pull all the slack wire on a certain lead. Will and the lineman had worked at this nearly all of one day, and as they had untied all the wires, making ready for a final pull, the lineman made the remark that a certain pole that had stood at considerable of an angle to the rest of the line should have a side guy in order to hold the strain when the wires were pulled up.

"I don't know of any place where we can fasten it," said Will.

"What is the matter with that tree over there?"

"The owner would never let us put a wire on that, I know, for George tried it two weeks ago."

"There are two wires and brackets on there already."

"Yes, but that is his own telephone line."

"Do you ever have any trouble on that drop?" asked the new lineman with a wink.

"Yes, two or three times a year."

"Well, now you go back to the shop and get me enough No. 9 wire to go across there twice. We have only about twenty-five wires to hold here, and that will hold them. Bring me also ten porcelain knobs, the heaviest you have and we will fix up this line so that it won't get in trouble any more. See?" said the lineman, with another wink.

Will did so, and they proceeded to climb the tree, knock off the brackets, and put two knobs, about an inch apart, one behind the other, driving them home with 6-inch wire nails, with a leather washer under the nailhead to keep from breaking the knob. Then the wire was fastened to the two knobs in figure eight fashion, so that the strain came equally on both. They did the same with the other wire, and then connected the house drop onto these two. Then going to the pole, they put on two more double knobs, one under the top arm, and one under the third arm. Then they put on the blocks and pulled those wires till they were tight enough to hold the pole in place, and connected the subscriber's line to the two.

"Now you see," said the lineman, with a grin, "those two wires will never get crossed, and two teams could not pull

them down. You've sometimes got to use strategy in this trade, my boy."

George scarcely appeared at the office for the next two or three days, receiving and giving all instructions by telephone, and in his absence the manager had secured several new subscribers, and accordingly sent Will and the new lineman, whom we shall call Tom, to connect them in.

The new man did several things that Will had never seen done before; so when George came in he began asking questions which caused that gentleman to go out and inspect the work.

"See here," he called to Tom, who was out in the street, "you have brought those wires to the house and down as far as the cellar window with bare wire and porcelain knobs. Now, we don't do our work that way here. Yes, I know some of the local Bell companies still do work that way in order to save annunciator wire, but that kind of work is out of date. No, I am not finding fault with you, for you understand line work, but I want to show you a better method than the one you have used here.

"Do you have any idea that all those knobs—there are eight of them—improve the appearance of the house, or the insulation of the line? But there is still another objection: These bare wires down the side of the house are in easy reach of everybody, even the children, and as we have several kinds of high potential circuits in this town, a broken wire might be the means of killing some one. Now in the future do not bring bare wire down the side of the building nearer than nine feet from the ground, or, near enough to any open window for people to reach.

"Now, this inside wiring is done with annunciator wire and looks like a boy's work. William, did you do this?"

"Yes," replied Will.

"Well, you certainly did drive staples enough into that wire to hold it down for all time. Half a dozen would have been enough, and I'll bet you have at least three dozen in this short run of about twenty feet, and driven down so hard that it is a wonder you did not cut the wire in two. Remember, in the future, that though wood may be dry on the outside, it is liable to be more or less damp on the inside, and so many staples pressing hard against the wire, and with their points reaching into the wood, will lower the insulation and perhaps increase the noise on the system. What is this? Two wires under one staple and that staple driven down hard! Pull that staple out and separate those wires. 'Tis true, I have sometimes placed two or more wires under one staple, but when I did so I never drove it more than half way in, so that the wires were perfectly free to move; that is, they merely lay in the staple, but were not held by it. In fact, I nearly always drive my staples in that way. I have made runs of 300 feet and the only staples that held the strain on the wire were at the ends. In this way the staples do not cut the insulation of your wire.

"Of course, this cellar is very dry and so are those joists, so that there is no particular harm done, but don't do it that way any more.

"Here," said he, on going up stairs, "is another thing to which I wish to call your attention. Why did you bring this wire up over the baseboard and outside the wall to reach the telephone, when you could just as well have dropped it down inside of the wall; don't you see that in that way the wires would be out of sight and make much neater work? Now, rip that wire out and I will show you how to do that. Here, take your quarter-inch bit and bore a hole right into that wall through the lath and plaster. That is good. Now, as the hole you bored through the floor is almost directly underneath the one you have just made, you can use that as a guide in getting your location in the cellar. Bore from the cellar upwards about three inches inside of that other hole; bore through the floor and studding plate. All right. Now you see all we have to do is to tie a small weight on a string and shove it through this hole right over the instrument, work it along till you feel the weight touch the studding plate. Now go below and take a piece of iron wire, say, two feet long; make a short hook on the end of it, shove it through that hole you made in the cellar and fish for that string. There, you have caught the string; now pull it through. Never mind about getting that end; if you have the string tie the ends of your wires in it and let them come up. Now we have the wires at the telephone. We will pull them up, take a foot more than we really need and shove them back again. Now, does not that make a neat job? Remember that trick.

"Here is a place," going to another house where the wiring was not finished, "where you do not need to come to the cellar at all. Go up to the roof and bring your house wires into the garret and drop down between these walls right to the instrument. Bore the hole close to the knobs and use no staples on the outside at all, and let the wire lie loosely between the joists. No, you really don't need any staples at all, though you might drive one in each wire where it drops down the partition if you are afraid it may be disturbed. There, it didn't take over fifteen minutes to do all that. That was easy.

"Here is a brick house and we cannot fish wire between the walls, though in some brick houses there are furring strips to keep the plaster away from the outside walls, where by using a long No. 12 steel wire with the end turned over to keep it from catching in the wall you could push it down from the garret and find it with a fish wire down below. In this case, however, we cannot do that, so we must plan some other way. Here! Bring the line wires over to this window. Drill a hole in the brick about four inches deep and fit a plug into it, and fasten a porcelain knob there with a 3-inch screw. Same for the other knob.

"Now let us look around inside. Yes, I see they want the instrument placed over in that corner. No, we don't need to go down to the cellar to get there. Bore a hole right in the upper corner of this window and bring the wires in there. Now you see there is a picture moulding all around this room and we can tie those wires together and lay them all the way around the top of that picture moulding, where they will never be seen. Now take a plumb line and find a spot right over the center of the instrument and bore a small hole in the plaster right underneath the moulding so that the wires won't have to come down on the outside of it. Put a little tape around the wires where they drop down through that hole you have just made, as an additional protection against dampness or abrasion from the plastering. Twist those wires neatly together, pull them down tight enough to straighten them and staple to the top of the telephone. There, that makes a very neat job, though there is a wire molding sometimes used for this purpose that conceals the wire altogether, but we generally make people pay extra for that kind of work.

"What have we got here?" he said, as he came to a large grocery store. "Our only way to get in here is to bring that wire to the back end of the building down the inside and into the cellar. No, do not run wires where boys are liable to pull them loose and break them. Here is a damp cellar and you must not use any annunciator wire here at all. Get some of that rubber-covered duplex wire and use it from the line to the instrument. Always remember to use annunciator wire only in clean, dry places, and if you have a run of more than five or six feet outside of a building use rubber-covered wire also.

"Now here," he continued, as they arrived at another house, "you came down through the cellar and used up a lot of wire when you could have bored a hole right through the side of the house just above the instrument and reached the live wires with about ten feet of duplex.

"Now this telephone," going inside, "seems to me to be placed rather high. Why, the lady of the house will have to stand on a box to reach it. Lower that instrument down

and when you put a telephone in a residence again find out which of the family will use it most frequently and adjust its height to accommodate them. It will frequently be noticed that a short woman has a very tall husband, but no matter, you adjust the telephone to her height when standing on the floor, and if her husband wants to use it let him come down to her level—not she to his—by stooping down, or sitting on a chair. You may not know it, but nine-tenths of these residence telephones are put in for the benefit of the women folks, and as long as they are pleased the instrument will stay there.

"Now a few directions as to bringing the wires over from the pole line:

"In the first place keep your wires up as high as you can keep them up.

"In the next place spread them out at least two feet apart unless you use weatherproof wire to keep them from getting crossed.

"Thirdly, do not pull your wires tight between the pole and the house, for it not only pulls the pole out of line, but a tight wire makes somuch noise that it is a regular nuisance. By spreading your wires out and giving them both the same degree of sag they are not liable to get crossed, even though quite slack.

"Fourthly, brackets are an ugly fixture to place on the side of a house. Porcelain or glass knobs are neater and practically just as good, but do not use too many of them. Very few houses require more than four.

"Fifthly, keep clear from trees as much as possible, and if not possible use covered wire. Look well after little leaks along the line which, though seemingly unimportant, amount to considerable in the aggregate and make 'bum service.'

"Sixthly, lastly, and all the time, make your work look neat and workmanlike, for people judge a company largely by the quality of its work, and we want them to have a good opinion of our company."

Digest of Telephone Patents

By Edward E. Clement

885,915. Busy Signal Apparatus. Erickson. An interrupted high frequency alternating current is produced by means of two co-operating interrupters. Application filed November 12, 1906. Patent assigned to Automatic Electric Company.

886,031. Toll Telephone System. Baird. The invention lies in a coin-refunding means and means for shifting the same. Application filed January 27, 1902. Patent assigned to the Baird Manufacturing Company.

886,220. Registering Telephone Call. Kitsee. Each subscriber's station is provided with a registering device and a polarized electro-magnet in operative relation thereto. The register is operated by an auxiliary circuit from the central office. Application filed June 26, 1907. Patent unassigned.

886,262. Switch Cord Plug. Smith. The cord proper is provided with a ball-shaped extension adapted to enter a spherical socket in the switch cord plug, thereby rendering the latter movable with respect to the switch cord. Application filed September 1, 1906. Patent assigned two-thirds to George F. Childress, Wills Point, Texas.

886,497. System and Apparatus for Telephone Local Toll or Pay Station. Harrison. This device comprises a refunding chute in which the first coin deposited is held, thereby deflecting subsequent coins into the cash-box, with means controlled by the central office for permitting the suspended coin to fall into the refunding receptacle. Application filed May 10, 1905. Patent unassigned.

886,498. System for Measured Telephone Service. Harrison. This system employs meters located at the subscriber's station and responsive to current from the central office to register the call. Application filed May 10, 1905. Patent unassigned.

886,499. Telephone Toll Box. Harrison. This device employs means for deflecting coins into a cash-box, the said deflecting means being set in position by the first coin deposited. Application filed January 12, 1906. Patent unassigned.

886,909. Party Line Telephone Selector and Lockout. Williams. The receiver hook of the wanted station is unlocked by current from the central station, the receiver hooks of the other stations on the line being locked. Application filed June 19, 1906. Patent unassigned.

885,007. Telephone Transmitter. Beachum. The microphonic element in the transmitter comprises a vacuum tube having separated electrodes with a mass of granulated conducting material forming a bridge between them. Application filed August 7, 1907. Patent unassigned.

885,180. Telephone Trunking System. Rupe. In this system the control of the connection of ringing current for a desired line lies entirely with the toll operator. Application filed November 15, 1906. Patent assigned to Kellogg Switchboard & Supply Company.

885,186. Three Wire Central Energy Telephone System. Simpson. The cut-off relay and supervisory signal are in a third conductor isolated from the talking circuit. Application filed February 5, 1906. Patent assigned to Kellogg Switchboard & Supply Company.

885,223. Receiver. Boyd. Curved tubular ear pieces are provided which may be adjusted toward or away from each other to fit any head. Application filed February 12, 1907. Patent unassigned.

885,270. Telephone System. Bayberry and Holland. A selecting instrument is located at each station and a definite number of current impulses in one direction serves to set the instrument while an impulse in the opposite direction serves for its restoration. Application filed April 12, 1902. Patent assigned to Boston Telephone Selector Company.

885,348. Telephone Hook Switch. Knight. A spring-controlled plunger is adapted to be moved vertically by the receiver hook and to actuate the contact springs. Application filed April 13, 1906. Patent assigned by mesne assignments to Century Telephone Construction Company.

885,429. Telephone Toll Box. Brisbois. This device employs a turnstile which may be actuated with a coin and the arc of rotation of the turnstile is limited by means of co-

acting stops. Application filed May 14, 1907. Patent assigned one-third to Richard W. Poelma, and one-third to Martin Dahl, Chicago, Ill.

855,859. Telephone Stand. Oliver. The stand has a pivotal movement and may be automatically retained at any inclination by means of a spring-actuated balancing mechanism. Application filed September 13, 1906. Patent assigned to Oliver Manufacturing Company.

887,071. Telephone System. Dean. The object of this invention is the elimination of the noise in a waiting subscriber's receiver caused by the disconnection of battery from the line when connection is established with calling lines. Application filed November 11, 1903. Patent assigned to Kellogg Switchboard & Supply Company.

887,124. Voice Screen for Transmitter Mouthpieces. Ralston. This is a device adapted to be applied to the mouthpiece of an ordinary transmitter and to fit closely to the mouth of the speaker thereby concentrating the sound within the mouthpiece and rendering the voice inaudible to persons standing near. Application filed September 1, 1906. Patent unassigned.

887,231. Telephone Transmitter. Corwin. One object of this invention is to provide improved means for securing the granule-containing means to the bridge of the transmitter. Application filed December 27, 1906. Patent assigned to Corwin Telephone Manufacturing Company.

887,233. Call Register for Telephone Systems. Dean. The invention relates to a register at the subscriber's station operated by the subscriber himself and having visible characters for determining the number of calls, the mechanism being similar to a bicycle cyclometer. Application filed October 18, 1906. Patent assigned to the Dean Electric Company.

887,260. Operator's Selective Ringing Key for Telephone Systems. Manson. The invention is an improvement in that type of selective key in which one key of a row remains locked when depressed and is released by the depression of any other key in the row. Application filed November 15, 1904. Patent assigned to the Dean Electric Company.

887,261. Electrical Signaling and Switching Apparatus. Manson. This is a combined annunciator and spring jack, all the parts of which are mounted upon a front plate. Application filed June 14, 1905. Patent assigned to the Dean Electric Company.

887,263. Connection Switch. McBerty and Thompson. The object of this invention is to provide a connector which will afford the user protection against injury from high tension currents which may accidentally come upon the telephone line. Application filed December 7, 1904. Patent assigned to the Western Electric Company.

887,473. Telephone Receiver. Gibson. The shell is composed of vitreous material and the cap is secured to the body by co-acting threaded metal collars. Application filed August 23, 1907. Patent assigned to the Gibson Manufacturing Company, Danbury, Conn.

877,533. Apparatus for Telephoning. Sindingchristensen. The apparatus comprises line conductors provided with condensers arranged at intervals and joined in parallel, thereby permitting a line of great capacity to transmit better than a line of small capacity. Application filed May 17, 1901. Patent assigned to Wm. H. Locke, Brooklyn, N. Y.

887,645. Antiseptic Lining of Talking and Hearing Tubes for Telephones. Jankelowitz. The ear and mouthpiece of receiver and transmitter are lined with antiseptic paper which after use may be torn out thereby presenting a fresh layer. Application filed May 25, 1907. Patent unassigned.

Approximately one out of every twenty-one calls on a city telephone wire is to ask "Central" what time it is.

AN OPEN LETTER.

To the Independent Telephone Interests of the United States and Canada:

In literature being put out by the American Union Telegraph Company my name and the name of the International Independent Telephone Association is being used without authority.

It is variously stated in said literature that said company "has entered into negotiations with A. C. Lindemuth, president of the International Independent Telephone Association (consisting of no less than ten thousand companies with over two hundred thousand miles of line), to operate over as many of their lines as it may care to use," and that said company had "entered into contract with the International Independent Telephone Association to operate over as many of their lines as it may care to use," and that "contracts have already been signed leasing for a long term of years nearly two hundred thousand miles of telephone lines to the American Union Telegraph Company," etc.

No contracts or negotiations have been made or are pending between myself or the association and said telegraph company.

A. C. LINDEMUTH,
President International Independent Telephone Association.
Chicago, May 23, 1908.

AN ANCIENT TELEPHONE.

HOW old is the telephone? An ingenious Frenchman—M. Henry Pacory by name—has evolved a theory that the ancient Egyptians had an instrument that transmitted the human voice, and the Boston Herald has the following to say about it:

"A little more than 100 years ago the celebrated French scientist Monge, who accompanied Bonaparte to Egypt, was considerably puzzled by the discovery in the Temple of Mehemet-Abn, in Upper Egypt, of coils of wiring which lay—and had probably been lying for ages—in a small stone chamber, and, tangled among them, several ivory and bone objects which resembled our common drinking horns.

"On his arrival at the Pyramid of Gizeh he discovered in a vault of about the same dimensions more coils of wiring matter, with similar ivory and bone horns. The telephone was then undiscovered, and, naturally enough, Monge did not understand the nature of his discovery, which has since, says M. Pacory, been shown to have been nothing else but a primitive telephone.

"The instrument is said to have been in use in the days of the Pharaohs. It was naturally a very simple contrivance—much resembling our toy telephones—and did not cover a distance greater than two or three miles. Tacitus tells us that when Antony went ashore after the battle of Actium he was accompanied only by a captain of his guard. Since all others had deserted him, it is not unlikely, says the Frenchman, that he telephoned to the fair daughter of the Pharaohs, asking her to come and comfort him in his last agony."

BUSINESS ASSOCIATION REBUKES BELL COMPANY.

THE Merchants' & Manufacturers' Association of Long Beach, California, has presented to the council a resolution approving the rates of the Home Telephone Company and disapproving the proposed increase of the Sunset company. The association is so wrought up over the threatened increase that in its resolution it declared one telephone company is sufficient for the business men. The Sunset company has also met with disfavor on the part of the people who have had occasion of late to call up West Long Beach. It is claimed that West Long Beach is a portion of the city of Long Beach and that the Sunset company has no right to charge long distance rates for that service.

Questions AND Answers By H.P. Clausen

SEMI-AUTOMATIC SYSTEMS.

I WOULD like to have some information as to the operation of the so-called automanual telephone exchange systems. I have read some of the descriptions, but do not find that it gives me the information I want.—R. S., Kansas.

When it is necessary to connect two telephones together it may be done in a number of different ways. The simplest method of course is to connect the two telephones as in a private line system where the telephone user A may call subscriber B to the telephone by simply pressing a button, turning a crank, or using any other suitable calling signal. With a large number of telephone lines it becomes necessary to establish some switching mechanism so that telephones A, B, C, etc., may be connected together at will without any interference between the different lines. This is accomplished in one of the systems by simply installing a switchboard at the central office and supplying the switchboard with signal receiving and transmitting apparatus as well as interconnecting cord circuits for establishing conversational connections between the different lines. This is ordinarily called a manual switchboard, whether it be of the local battery, common battery, transfer or multiple type.

The full automatic switchboard is that system in which the subscribers have their station apparatus supplied with suitable mechanism for permitting them to individually call any line connected to the system by manipulating suitably arranged switches, these switches making certain electrical contacts and operating suitably constructed and distributed apparatus at the central office, which automatically connects the calling subscriber's lines with the called for subscriber's circuits. In this system it will be observed that the operator has been eliminated at the central office; that is, the subscriber performs the necessary operation for connecting his line with another.

The automanual system differs from the manual system in one respect; the central office operator is not provided with any flexible cord circuit connections. The central office of an automanual system consists of a series of switches, similar to the fall automatic system; but instead of the switches being controlled by contact mechanism operated by the calling subscriber, the automanual switches are utilized by operators at the central office for connecting the line of the calling subscriber with that of the called for subscriber. It is obvious that any type of telephone may be used at the subscriber's station for signaling the central office. The operation briefly being as follows: The subscriber drives his magneto generator for signaling the central office, or upon the common battery or centralized calling plant, removes his receiver from the hookswitch. This produces a signal observed by the operator. The operator manipulates the proper key and places her telephone circuit in connection with the calling subscriber's lines. Learning what line number is wanted, the operator manipulates switches whose functions are similar to the apparatus required in the full automatic subscriber's station switches in the respect that the switches operated by the operator automatically connect the calling subscriber's circuit with the called for subscriber's circuit. It is quite evident, with a connection established, that either subscriber placing his receiver on the hookswitch clears the line circuit, and in this manner relieves the operator from the usual necessary duties of pulling down the connection. This briefly is what we know as the automanual system. In the system you mention a calling subscriber signaling the central office automatically starts in motion a suitably arranged switching mechanism, which selects the first not-busy cord circuit of the first not-busy operator in the exchange. Say we have a ten-position board, and the operators at the first three positions are busy taking care of connections. A subscriber calling the central office sets the switching mechanism in motion and automatically has his call transferred to the first not-busy trunk circuit upon the fourth position. This operator then picks up the call and extends it through in the manner explained above. While this connection is being established, if another subscriber calls the central office, assuming that the second operator is no longer busy, the call will immediately record itself before the second operator and receive attention at that position. Owing to the absence of the usual line signals it is easily seen that the operator's positions may consist of simply a series of lamp signals and switching keys. There are no cords or plugs and the switching keys are usually in the form of trunk circuits, terminating in connector switches in a general way similar to the full automatic system.

NOISY GROUNDED LINES.

In changing the connection of one of my telephones on a party line I failed to reconnect the wires in a proper manner, one side of the telephone being connected to ground, the ground side of the lightning arrester connected to one of the line wires and the telephone connected to the remaining line wire. The telephone worked all right for several days, but the service was interrupted recently; the line also was noisy, but this stopped when the ground was cleared.—C. A. P., Wisconsin.

It is rather difficult to explain your trouble without having more complete information available. You say the line was noisy. Was the noise due to street railway or electric light currents, or was it simply due to noises which may have been produced through the line being partially grounded or partially short circuited? The fact that you had the telephone connected from one of the line wires to ground and the remaining side of the line grounded through the lighting arrester, easily explains why you could talk over the line without any trouble. As to the telephone failing to operate at certain times when it was connected, this, of course, may be due to the ungrounded line wire accidentally becoming grounded. Regarding the noise, as stated before, this would be a very difficult matter to determine unless you gave us the nature of the disturbance. We are inclined to think, however, that the noises may have been due to a partially grounded line wire, for the service appears to have been interrupted, which would naturally be the result if the

line wire were completely grounded; but if only intermittently grounded, say through a swinging wire of some kind, noise would be the natural result.

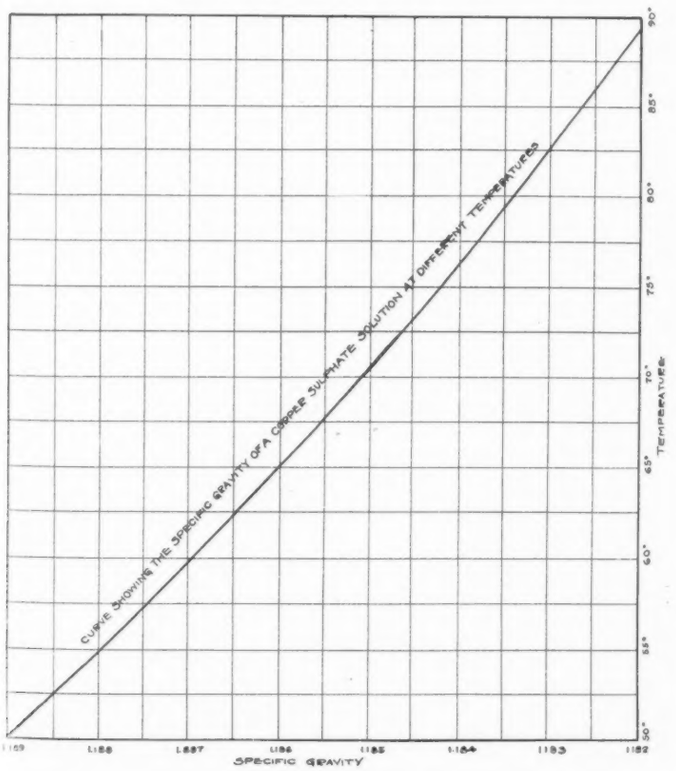
NOISY MAGNETO GENERATOR.

What is the cause of the grinding noise one hears while driving a magneto generator? Also is there a remedy for this effect?—S. U., Pennsylvania.

Upon examining a magneto generator you will find that there are two gear wheels, a small one upon the armature and a large one connected to the crank shaft. If the teeth of the gear wheels do not mesh perfectly and have become more or less worn, a grinding effect takes place. There is scarcely any remedy for this, although if the particular type of generator were before us we might be able to offer suggestions which would result in a partial relief of the trouble. Carefully examine the large gear wheel and observe whether it is not slightly adjustable away or towards the smaller gear wheel. Also be sure and determine whether the bearings of the generator do not require a drop of oil. Sometimes the armature vibrates in its bearings and it may be this difficulty which you attribute to the gear wheel. Also carefully examine the gear handle. You will find a rubber handle turns on a metal pin. A little oil applied to this bearing surface frequently clears a disagreeable squeak or chattering noise.

TESTING GALVANIZED IRON WIRE.

I understand that the galvanizing of iron wire should be done in a certain way and that the temperature of the solutions used for testing the galvanizing has same effect upon the results. Can you give me any information upon the subject?—J. S., Ohio.



The United States government requires certain tests of all galvanized wire submitted to them for approval. The drawing which is shown above gives the specific gravity of copper sulphate solutions at different temperatures. The specific gravity you will observe lies between 1.182 and 1.189 with temperature between 50 and 90 degrees. The intersecting points upon the curve showing the correct specific gravity readings at certain temperatures. The government requires that the galvanizing shall be of a coating of pure zinc, evenly distributed, homogeneous, and strongly adherent to the metal. The samples, after having been thoroughly cleaned with a solution of potash or other strong soap, should be rinsed in clear water and wiped dry. This washing is done so that the galvanizing will be free from dirt, grease or other surface impurities. After the article has been perfectly cleaned and dried plunge it in a bath of copper sulphate solution of a required density as shown by the curve submitted above. Allow the article to remain in the solution for one minute and then plunge it in clear water and immediately wipe perfectly dry. Repeat this process until a sample has been immersed four times. After such treatment no sample should show any deposit of copper, thus indicating that the zinc coating has not been entirely removed. In testing wires, No. 13 or smaller, the article is not required to stand more than one minute immersion and only one-half minute final immersion. It is also required that all sizes of wire shall stand bending once around their own diameter, and after straightening out shall show no cracks visible to the eye. Screw threads shall be galvanized, recut, and capable of withstanding at least one minute immersion bath, the rest of the article requiring four immersions. This one immersion of the screw thread does not apply to nuts.

PARTY LINE BELL TROUBLE.

I am using telephones equipped with combined A C and D C generators. These instruments are so arranged that the central office may be signaled without causing the bells of the telephones connected to the line to respond to the signal. At the same time the system permits of signaling the telephones from any of the stations by simply sending an alternating current over the line. Normally the telephone is arranged for signaling the central office only. When the push button is pressed, an alternating current is projected over the line and this results in signaling the different telephones as well as the central office. We find while signaling the central office that a direct current does not operate the bells connected to the line, but it does result in giving the bells a slight tap. This does not always happen but only at times. Can you advise what should be done to remedy the difficulty?—J. S., Kansas.

An alternating current ringer such as you are using upon your telephones will respond by giving one tap when you project a direct current over the line providing that the armature of the ringer lies in contact with the pole piece which repels the armature when the direct current is projected over the line. Obviously the remedy would be to make all signal bells so that normally the armature lies against the proper pole piece; that is, the pole piece which will not repel the armature, but rather attract it, and therefore not transfer the armature from one pole piece to another when the direct current is projected. Such a signal bell can be produced by attaching a spring to the armature so that it is normally held over to one side. Even then, however, it is necessary that the telephones be connected to the line circuits in such a manner that the direct current from any of the stations when projected over the line is always in the same direction; that is, station No. 1 when signaling with the direct current, and we will say projecting a positive current, does not tap any of the bells; but in station No. 2, if the generator is so connected that a negative current is projected over the line, any current projected from this station will tap all of the bells connected to the line. Therefore, in order to overcome your difficulty a good plan will be to provide your ringers with a spring tension so that the armature will always be drawn over to a certain side; and further, in order to prevent any tapping, it is also necessary to connect the generators to the line circuits so that the same sign of direct current is projected over the line circuit.

Playing checkers by telephone is the favorite pastime of Captain Austin Harrington of Holland and Eugene Fellows of Olive, Michigan. They claim the telephonic game is almost as fast as if both were seated at the same board.

Telephonic Reminiscences

By C. E. McCluer

[Fourth Installment.]

DON'T forget that I am writing of telephony as it was nearly thirty years ago, only three or four years after the invention of the wonderful "far speaker." Even experienced telegraphers had much to learn about the telephone, and almost as much to unlearn about the behavior of electricity in connection therewith. It cannot therefore be wondered at that it required years of experience on the part of laymen and young college graduates to enable them to successfully construct and maintain and operate complicated exchange plants and systems. The Southern Bell Telephone & Telegraph Company had been but recently organized, and among its employes were but few individuals who could boast either telegraphic or telephonic knowledge and experience. I could lay claim to extended telegraphic experience and a slight practical knowledge of telephony gained by the construction of a pair of telephones and the management for a time of one exchange system. No one else in the employment of the company at that time save Mr. Kates, possessed even such limited qualifications, and as I was shortly given the full district superintendency, I was for the time looked upon as the company's expert, and my opinion and advice was frequently sought regarding matters of a purely technical character.

The first "pole line" exchange as distinguished from the house-top construction which was originally adopted, that at Alexandria, Va., was designed and constructed under my supervision. The manager of the Western Union Telegraph office had, like myself, become interested in the subject of telephony, and had worked up among the Alexandrians a sentiment in favor of an exchange, and reporting that he had secured twenty-six subscribers at the current rates, I was authorized to submit an estimate for the construction of a pole line exchange and apply to the municipal authorities for a franchise. After a preliminary survey of the city I accordingly prepared an estimate covering pole room for a half hundred wires with extra space for a possible one hundred per cent increase, being quite sanguine that in the course of a few years at least we would secure that percentage of increased patronage. My estimate was after some hesitation approved by our executive officers, and I was authorized to go ahead with the work. But as illustrative of the small modicum of faith in the future of the telephone entertained by experienced telegraphers of that day, I will relate that on the day I visited Alexandria in company with my foreman of construction for the purpose of starting him on the work, I was positively instructed by telegraph to build only for the twenty-six subscribers whose patronage had already been pledged. As a consequence of this short-sighted policy, the plant had to be largely reconstructed and considerably enlarged within the next twelve or eighteen months, the patronage having exceeded even my most sanguine expectations. It took the telephone people a long time to learn this lesosn thoroughly. Even to the present day both the Bell and the Independent authorities usually fail to grasp the future possibilities when laying out new plants, or improvements and extensions to existing systems, so that they are continually under the necessity of increasing their facilities at an extra expense and disadvantage, in order to accommodate the constantly increasing demand for telephone service. I always did advocate building for liberal increases in patronage, but never reached the point where ample provision was made for future growth, except in one or two cases like that of Newberne, N. C., where the introduction of an exchange was premature and not really demanded by the business or necessities of the people, at the then current rates. The marvelous growth and extension of the telephone, especially since the loss by the Bell company of its patent monopoly, has been so rapid and so extensive that it has been hard for telephonists to keep up with it, much less to anticipate it. And to me it looks as if we were even now merely on the threshold of the incompleted structure. With the improvements and simplification of local service apparatus doubtless still possible, we may yet find ourselves within speaking distance of the antipodes, with the aid of perfected appliances for long distance "wireless" telephony.

Business increased rapidly and I had my hands full to overflowing. I was urged to extend existing exchanges and work up new ones in the town not already occupied, and the house-top construction having been discovered to be a delusion and a snare, I had to secure municipal franchises for pole line plants to supersede the house-top fixtures at Richmond, Petersburg and Norfolk, Va., Wilmington and Raleigh, N. C., and other places where small and disappointing exchanges had already been inaugurated. All this necessitated frequent and sometimes prolonged absences from Richmond and much wrestling with municipal legislatures, street committees and city engineers. During these absences my desk would become overloaded with correspondence and work that made me groan when I got home. But somehow I got through it by dint of intense application and unremitting toil. As a rule I was left by my superior officers largely to the exercise of my own judgment and discretion in the performance of my official duties. They only insisted on being kept advised as to my various enterprises in behalf of the company, and on being consulted as to the expenditure of funds for the construction of new plants or the equipment of exchanges. In nearfly all other respects I was allowed a free hand in the conduct of the affairs of my district, which I exercised, however, with the every present knowledge that I was liable at any time to be called on for an account of my stewardship, and to defend any of my actions that did not chance to chime in with the ideas and opinions of our executive officers. Of course, the general policy of the company was dictated from New York, and I was at any and all times amenable to instructions. Sometimes such instructions would run counter to my views and recommendations, but as a rule my representations were courteously received and kindly adopted. It has ever been my policy, as I esteemed it to be my duty, to give my views when asked for with the utmost candor and frankness, or when my judgment told me a mistake was on the point of being made. But that duty once performed, I was always ready and willing to carry out the policy and instructions of my superiors cheerfully and to the best of my ability. The principle contained in the old aphorism, "obey orders if you break owners," was early instilled into my mind dur-

ing my boyish railway service, and I have always tried to live up to it. I mention this matter now while it is in my mind, because it has been charged that when I saw the executive officers of the company were making a serious mistake in their policy, I should have resigned rather than submitted to being the unwilling instrument of carrying out a policy that my judgment condemned. That, I contend, would have been the height of folly as long as the things wherein I differed with the shapers of the company's policy were mere matters of administrative detail about which we might sometimes quite naturally differ, and not matters involving any sacrifice of moral principle. Had I been required to perform duties or commit acts not in conformity with a strict observance of law, human or divine, I would have handed in my resignation instanter. When it came to the point of resorting to questionable methods of securing either favors or immunity from state or municipal legislatures I was adamantine. Unless I could carry my point by sheer force of solid argument or the pleadings of justice, I preferred to abandon it.

During one of my fights for a franchise I was asked if I thought it would be advisable to descend to the use of "golden" arguments in order to insure the success of my application, as more convincing to certain minds than the oral arguments upon which I was depending. I responded most emphatically in the negative, inviting another man to be put in charge of the negotiations in case it was deemed necessary to resort to such means. And yet during that very controversy, one of my opponents in the legislative body with which I was dealing told me that I did not use the most conclusive argument. In response to my request for more explicit information he turned his back with his right hand extended behind him and towards me, and wriggled the ends of his fingers in a most suggestive manner. I affected not to have apprehended him and resolved that I would make no further attempts to enlighten him as to the true interests of his constituents and would disregard his opposition entirely. He opposed me bitterly to the end, but I won in spite of him and several others of similar dispositions.

I experienced more trouble and difficulty in securing a franchise in Richmond than I did elsewhere. With my application for a franchise I submitted the draft of such a paper as I knew would be accepted by the company; which had in fact, been passed upon by our executive officers and had received the stamp of their approval. The terms and conditions of the ordinance suggested were so liberal and just to the city that some of the municipal legislators evidently imbibed the impression that I had some ulterior object in view; that there was a "nigger in the woodpile" somewhere concealed from observation, and believing too that the franchise would prove exceedingly valuable, they at once proceeded to load the act down with sundry onerous restrictions and requirements that robbed it to a great extent of its value to the company. This disposition I combatted vigorously believing that it would not be wise for the company to accept a franchise that taxed them too heavily and tied them up too helplessly. It was accordingly a long struggle, taking me eighteen months of strenuous effort to secure an acceptable ordinance. My original draft was so amended and distorted by the common council and board of aldermen as scarcely to be recognizable, and I could not accept it as the progeny of my brain. Finally, after arguing before committee after committee to no purpose, I withdrew the application entirely and gave out that we would have to be content with the old house-top plant. This step was taken only after I had exhausted every effort to secure the adoption of the original draft of the franchise, which protected the interests of the city to such an extent that unjust suspicion was excited and opposition engendered. I learned subsequently that some of the legislators had somehow imbibed the mistaken impression that I was a "sharp Yankee," commissioned by the northern owners of the corporation to chisel the city out of a valuable privilege, and they could not understand or appreciate the liberality displayed in the original draft of the franchise. They therefore sought to make me show my hand by tacking all sorts of amendments upon the ordinance, and restrictions upon the enterprise, and were greatly surprised and disturbed when I formally withdrew the application. After a few months of mysterious silence, however, I renewed the application, but left the task of drafting an ordinance to the municipal legislature itself. I then made a display of indifference as to the result of the renewed application while the municipal law manufacturers were wrestling with the subject. As I very freely gave out that I could not improve the unsatisfactory service of the exchange until I was in a position to erect poles on the streets and eliminate the dilapidated house-top fixtures, the municipal solons were subjected to pressure by the business interests of the city and urged to grant our application without delay. They finally accorded us a franchise that was acceptable to our executive officers, under which the plant was constructed and the exchange operated for some fifteen or sixteen years, or until it was revoked by the same authority that granted it. But it proved to be a more desirable ordinance for the company than any one ever dreamed I would be able to secure, and much less favorable to the city than my original draft. I believe the officers of the company accorded me much credit for engineering the matter as I did, entirely unaided and without resort in a single instance to questionable methods or improper arguments.

The first regular "Law" system switchboard introduced into the Richmond exchange was designed by myself and constructed under my immediate supervision in a local cabinet shop. The connecting strips from the old magnetic board were mounted on a pyramidal shaped black walnut superstructure attached to and supported by a single central leg or post firmly secured to the floor, with a thick black walnut table surrounding it about three feet from the floor and bored for plugs, cords and wire connectors for five hundred lines, representing that number of subscribers' stations. While it was hastily designed, constructed and installed and was rather crude in appearance, it answered the purpose for which it was designed admirably, and the four operators whom it eventually accommodated, gave certainly as good, if not a better service up to its full capacity, than was ever rendered on any of its factory built and much more artistic successors.

This home-made board was inaugurated by the first female operators employed by the Southern Bell Company, two intelligent young ladies handling the service far better than the eight or ten youths previously employed as operators on the old magneto board. By the time the exchange grew to four hundred stations the force had been increased to four, the ultimate "position" capacity of the board.

The substitution of female for male operators was, I think, the salvation of the telephone exchange service not alone at Richmond, or in the territory of the Southern Bell, but throughout the entire country. The youths at first utilized as operators did not possess the necessary qualifications of patience, amiability and domesticity, so to speak, to enable them to patiently endure the irksome confinement to the office and switchboard during the long hours of service, or to take from irate and exasperated subscribers and non-subscribers (the latter particularly), meekly and unresentfully, the impatient words of complaint and criticism so frequently, and I may add, so often unjustly hurled at them. The boys kept me in a continual state of turmoil with irate subscribers on account of their quick tempers and the ill-natured "sass" they gave in return for the continual fault-finding and impatient criticisms, and I was forced to make examples of several of the worst offenders by dismissal. Besides, such close confinement to the switchboard and tables for long hours at a stretch became so irksome that it was

difficult to prevent them from skylarking and neglecting business. Hence it was that I first suggested the employment of female operators and took advantage of the first change in switchboard to make that improvement in the operating room force. And I never had cause to regret it. Telephony, switchboard telephony, is eminently suitable for the weaker sex, and it is fortunate for all concerned, the companies as well as the feminines themselves, that such a wide avenue of employment should have been thus opportunely opened to them. It is a great pity, however, that they are not better paid. They do the switchboard work, the best of them, as well or much better than a man can do it, and I believe when a woman does a man's work as well as the man can do it himself, she is worthy of the man's wages. Realizing that it was in the operating room that the character of the service was made or marred, I always advocated the employment of the brightest and most intelligent and conscientious young women that could be secured, and to that end I was a "bull" as regards operators' salaries; believing that liberal salaries would alone command first class talent. And therein I suspect I again ran counter to the ideas and policy of the telephonic Bostonians.

One of the four female operators first employed in the Richmond exchange was a very pretty and attractive brunette with jet black hair and eyes, whose most prominent foible was a decided penchant for flirting with her numerous male friends and admirers through her switchboard telephones in direct and flagrant violation of the operating room regulations. The chief operator finding his remonstrances of no avail, finally reported the facts to me, and I, as in duty bound, took the young lady to task and exacted from her a promise that she would sin no more in that particular. For a time I believe she kept her promise, but finally the temptation to talk became too strong for her and she demonstrated the usual feminine weakness by suffering a relapse. For quite a while, however, she avoided detection by adroitly seizing her opportunities when the chief operator was absent from the room or busily engaged, or during the dinner hour when the operating room force was reduced to herself and one other operator. By placing her lips close to the transmitter she could carry on a whispered flirtation without attracting the attention of others in the room. And she would do that without neglecting her duties to her subscribers, who would be served promptly, as it were, between whispers.

Another of the young ladies, a few years her senior perhaps, was her direct antithesis in disposition and demeanor. She was in fact rather inclined to be fastidious and over particular if not prudish, and was never known to be guilty of an infraction of the rules. One morning she came in to my office in a great state of excitement and declared that unless Miss Brunette was prevented from talking to the men from the switchboard she would be compelled to resign, as she could no longer risk the chance of being compromised by her acts. After I had succeeded in some measure in calming her, she proceeded to explain that on the previous evening a young gentleman had been brought by a mutual friend to call on her. After the usual amount of small talk indulged in under such circumstances, the newly made acquaintance passingly alluded to the very pleasant and interesting telephonic conversation, he had been permitted to have with her that afternoon. Now Miss Precise would have esteemed it an insult for any gentleman to have attempted to enter into conversation with her either by telephone, or in her actual presence, without the formality of an introduction. She was accordingly horrified at his assertion, and feelingly assured him that he was vastly mistaken, as she did not allow strangers to engage her in conversation, and she was not in the habit of transgressing the rules of the office, which forbade such conduct. He, however, persisted in his statement and quoted a number of her remarks and his rejoinders, declaring that in response to his request she had given him her name as that of Miss Precise, and had cheerfully given him consent to call on her that evening in company with their mutual friend. Then there was a scene, and Mr. Old Acquaintance and his protege had to beat a hasty retreat.

On reaching the office the next morning, she had extorted from Miss Brunette a confession to the effect that the young gentleman had engaged her in conversation against her will, and had persisted in talking to her over the call-wire although she was in mortal dread of being caught *in flagrante delictu,* and when he persisted in knowing her name, she had thoughtlessly given him the name of her fellow operator, but declared positively that she did not hear or respond to his request to be allowed to call on her. When Miss Precise finished her narrative she sobbingly reiterated her intention of quitting the service of the company unless I dismissed Miss Brunette forthwith. But they were both very skillful and efficient operators, and I did not relish the idea of losing either of them. They were extremely valuable to the company, and I did not have a competent substitute to take either of their places. I consequently felt disposed to temporize. After a few moments of cogitation, I remarked to myself, but audibly, "I reckon I might take Miss Brunette's transmitter away from her." "Yes, yes, that will be the very thing," exclaimed Miss Precise." Take the transmitter away from her and then she can't talk." After another moment of reflection, I added, "And I will take the transmitter away from you also." That was a gray horse of another color, and she at once protested that that would be entirely unnecessary as she never used her transmitter except to reply to a business question or to report "connection made" or "line busy." But I at once proceeded to carry out the idea the incident had suggested to my mind for the first time.

I had ordinary two-point switches connected in the local circuit of each switchboard transmitter so the microphone battery circuits could be readily opened or closed at will, and notified all subscribers through the newspapers and by circulars through the mail, that on and after a certain specified date, some two or three weeks in the future, the operators would be unable to answer their questions or talk to them from the switchboard, and they therefore must call for No. 180 (the chief operator) whenever they desired information regarding the service. I also informed them that a single tap of the bell (the Law system apparatus was equipped with tap or battery bells, not vibrators nor magnetos), in response to a call for a connection would mean "connection made," while two quickly consecutive taps would indicate "line in use." I then required the operators to begin the use of the signals at once, supplementing them, however, with the usual verbal "all right" or "line in use" through the transmitters. I also opened the battery circuit of a single transmitter occasionally when business was light, just to teach the operators by degrees to become independent of their transmitters. In this way I proposed to have the subscribers and public generally, as well as the operators, properly broken in to observe the new system by the time I had set for its inauguration, knowing full well that without some practice before hand they might make a failure of it. After all my care there were a few misguided individuals among the subscribers whom I had to visit personally in order to secure their cheerful compliance with the new rules and their hearty co-operation in making a success of the innovation. They had for so long a time been accustomed to hearing the dulcet tones of the central office divinities responding through their transmitters to their requests for service that they could not recognize the bell taps as an adequate or fitting response to their orders, and would persist in holding on to the call wire levers and repeating their orders until the chief operator would switch in and assure them that the man they wanted was waiting for them on the private line.

I thought I had used every reasonable precaution to insure the instantaneously successful inauguration of the new scheme so there could be no trouble or interference with the service. But I did not make due allowance for the "personal equation" of the next in command in the operating room, the worthy chief operator. He was a bright youth of some sixteen or eighteen summers, but like most young men of his age, knew better than his elders. Thinking it would only require a day or two for the operators and subscribers to learn the philosophy of the new departure, he concluded to anticipate the change by a few weeks. He accordingly one day opened all the transmitter circuits simultaneously without notice, before the operators had become fairly accustomed to the absence of the transmitters, and before many of the public users of the telephones had learned of the proposed change in methods. The consequence was that within a minute or two his act had created "confusion worse confounded" throughout the length and breadth of the exchange. Many of the subscribers could not understand the unwonted silence of the operators or their furious bell signals, and held on to their call wire levers and persisted in repeating their orders over and over again; while the subscribers who had been rung up for them, and who had responded to the summons, were yelling their fruitless "hellos" on the empty private wires. Every call wire was converted into a veritable bedlam, with voices pitched in all keys pleading with central to give them immediate attention, or a myriad other people whose bells had been rung, were vociferating loudly to central to know who had called them, or were frantically beseeching for 180.

I was busy at my desk, in blissful ignorance of what was transpiring in the operating room, when one of the operators bounced in wringing her hands, and with big tears streaming down her cheeks sobbed out, "Mr. Chief has opened all the transmitters—and—and—we can't do a thing!" I rushed into the operating room and found two other operators bathed in tears and utterly demoralized, while Miss Precise, and Mr. Chief who had taken up the discarded receiver of the absconding operator, were frantically ringing subscribers' bells and trying to catch from out of the babel of voices on the call wires such orders as were distinguishable. I rushed to the switchboard, closed the battery switches, and then placed the discomfited operator at the board again. The subscribers hearing once more the welcome voices of the operators were soon pacified, and within five minutes the normal volume of business was again flowing smoothly. I of course gave the chief operator a good verbal trouncing for his lack of judgment, and cautioned him not to open the switches again until I told him to do so.

At the appointed time the new scheme was introduced, but the operators and patrons having by that time been properly instructed, it was instantly and brilliantly successful, and proved to be one of the greatest improvements that had ever been made in the practical operation of the Law system. The use of the call wires being cut down to the bare transmission of orders for connection and disconnection, the service was simplified and accelerated, confusion was to a great extent avoided, and the natural propensity of the majority of the operators to talk from the switchboard effectually suppressed. In a few days the transmitters were removed from the operating room, and for a period of ten or twelve years thereafter, or as long as I remained in charge, there was never a transmitter used on the Richmond switchboard.

The Law system was so devised that it was eminently suitable for an innovation of that kind to be successfully adopted in connection with it. As the subscriber's bell magnet remains in the private line circuit when his transmitter and receiver are switched by the necessary manipulation of the lever to the general call wire circuit, it is possible for the operator to tap his bell without ringing in his ear. It is a pity that the same improvement cannot readily be applied to the signal and central energy exchange systems now so universally adopted for the larger towns and cities. But the presence of only a single circuit between the central office and the subscribers' station, militates against the use of a separate system of signals. The advantages arising from the banishment of the transmitters from the switchboard, and the consequent inability of the operators to indulge in the usual "static kick" in response to the ill-natured strictures of irascible subscribers are so great that were I in charge of such an exchange I would certainly set my inventive faculties to working overtime to devise a way of applying it in an unobjectionable manner. I believe it can be done. But would the momentary ring in the subscriber's ear be so very objectionable? I opine that it would be more than offset by the advantages were the scheme once in vogue. The objections would vanish in the light of experience just as did the adverse theoretical criticisms of my multiple test when it was found in practice that the ticking of the rheotome on the talking circuit did not interfere in the slightest degree with the satisfactory use of the telephones.

TELEPHONE, THEN TRAVEL.

ONE of the favorite telephone catch phrases has been "Don't travel, telephone," says an electrical journal. Now we have a variation that may become just as popular—"Telephone, then travel." Tickets and Pullman accommodations on the New York Central lines can be obtained by telephone or letter, under a plan just inaugurated by F. L. Vosburgh, general eastern passenger agent. By this arrangement anyone can obtain tickets by a messenger who is authorized to collect for them and complete any other arrangements necessary for the comfort of the traveler. At each of the New York City offices of the Vanderbilt lines these messengers will be constantly on duty, making possible hasty preparations for travel at any hour of the day. Although New York is one of the best-equipped cities in the world for the accommodation of the traveling public, offices of the various roads being located in all parts of the business district, Mr. Vosburgh says he has found that many persons who at times are hastily called away need still further aid in preparing for their trips. "We have inaugurated the plan to accommodate the busy traveler, and believe that the increased business will merit keeping it in operation," Mr. Vosburg said. "There are many persons who find it necessary to arrange for their accommodation in their home, hotel, club or office. We have competent representatives, who on the receipt of a note or telephone call will be sent to the prospective traveler's residence or office. He will take with him the necessary tickets and Pullman accommodations, collect for them and make all other necessary arrangements for the comfort of the traveler."

MAKING MONEY BY TELEPHONE.

AN APPLE grower in an eastern state, says a writer in the Agriculturist, had an experience last fall that illustrates how large may be the returns from the small amount invested in a rural telephone. One day when his crop was in just the right condition to market, a traveling buyer offered him a dollar a barrel for the thousand barrels of apples his prospective customer had to sell. The buyer insisted that the price was as high as anyone was paying, and the deal was almost closed, when it occurred to the farmer that there would be no harm in stepping to the telephone and seeing how much someone else would offer him. So he called The additional $500 made on that transaction by having a telephone in the house will pay his telephone bills for the rest of his life and he will then have some left.

This, of course, was a bigger deal than most sales made from the farm, but it will be found that the telephone will save you.

TELEPHONIC TRANSMISSION MEASUREMENTS

Paper Read Before the Institution of Electrical Engineers, in London, England

By B. S. Cohen and G. M. Shepherd

[Part Two.]

TWO FORMS of apparatus have been used, the barretter and the thermo galvanometer.

The barretter, otherwise termed the bolometer, is a device for measuring small alternating or fluctuating currents. It consists of a conducting wire or filament, which has a high temperature coefficient and a small mass, so that small currents will appreciably raise the temperature, and thus alter the resistance. The barretter has been employed by Professor Boys in constructing the radio mircrometer, by Fessenden, by Lieutenant Tissot for wireless telegraph measurements (see Journal of I. E. E., April, 1906), and lastly, by Professor Kennelly (see Transactions of International Electric Congress, St. Louis, 1904).

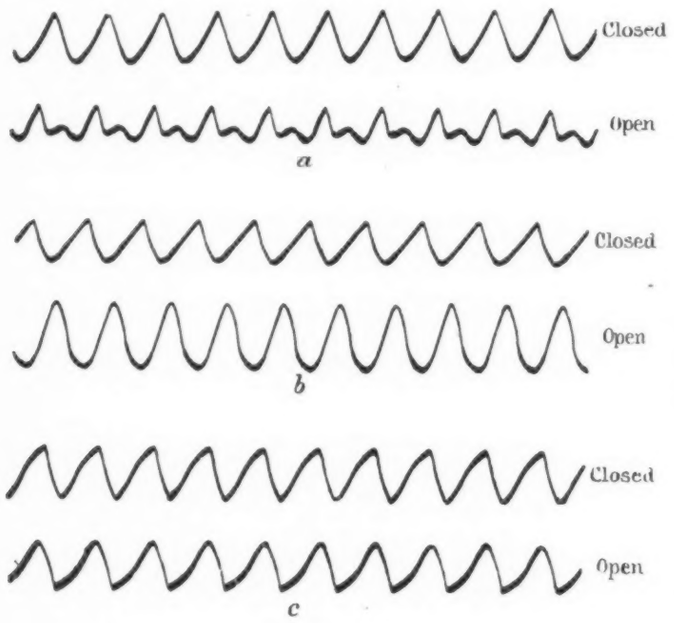


Figure 11.

Professor Kennelly used barretters made of very fine platinum wires. Owing to the extreme delicacy of these wires, Dr. Hayes, of the American Telephone and Telegraph Company, carried out investigations to discover a barretter more suitable for work outside the laboratory. He found that small low-voltage telephone switchboard lamps gave satisfactory results, and this has been confirmed by experiments carried out by us.

The best lamp we have found for this purpose is a special pattern twenty-four-volt curl filament lamp for telephone switchboard use.

The curve, Figure 12, shows the relationship between the current and the resistance using this lamp. Following the usual law, the greatest resistance variation with these carbon filaments occurs when using small currents.

Experiments have been tried to increase the sensibility of the filaments by overrunning the lamp for some hours, and thus reducing the mass; but although great sensibilities have been obtained, it was found impossible to make a number of barretters exactly similar. The filaments always reduce at

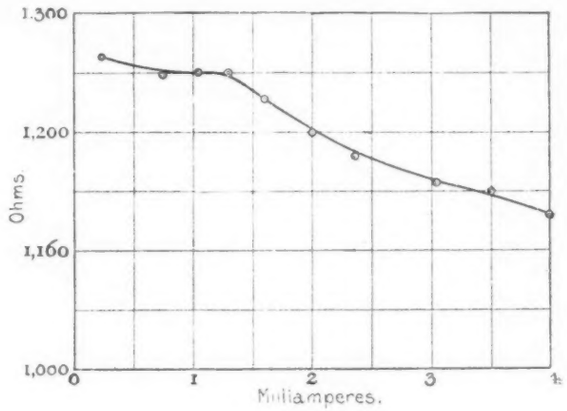


Figure 12.

their weakest point, and, in consequence, although two filaments could be obtained having the same sensibility, the time of response to a change of current varied, and with the null method of working barretters described further on this gave rise to trouble.

The following arrangement of barretters (Figure 13) has been adopted after considerable experiment. This arrangement enables measurements of apparatus and line impedance, capacity, etc., to be carried out, the result being obtained in actual ohm values and with very little more trouble than that involved in taking an ordinary resistance measurement with direct current.

The figure shows a source of alternating current such as a sine-wave alternator connected to two branch circuits, in one of which a variable resistance box A is inserted. The other arm has the apparatus or line to be measured, inserted at B.

The barretters are connected through adjustable resistances and batteries to the galvanometer, which can be of any pattern.

The shunt, which for general work can be varied from ten to about 500 ohms, helps to eliminate errors due to the impedance of the barretter circuits.

The barretters are first balanced in resistance by the adjustable resistances until the galvanometer indicates no deflection. The alternating current is then applied, the circuit being through the condensers and round the barretters. This current is stopped from passing from one branch into the other, *via* the galvanometer, by the four choking coils. When the resistance box in A is adjusted so that no deflection is indicated on the galvanometer, then the resistance unplugged in A, after making allowance for the impedance of the shunted barretter circuits, represents the impedance of B, and if the two barretters are not exactly similar, a second reading can be taken with A and B reversed and the mean taken. Variations in barretter resistance caused by

temperature changes have no effect on this arrangement, as the barretters are fixed close together and compensate each other.

Inductance.—Let R be the balancing resistance unplugged from the box, and r the total resistance of barretter and

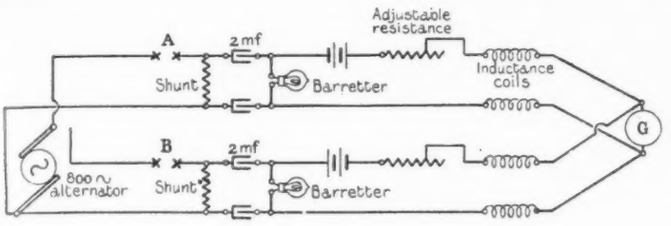


Figure 13.

shunt, and R_0 the effective resistance of the apparatus measured (includes true resistance and iron losses).

Then—

$$I^2 = R^2 + 2r(R - R_0),$$

provided that the impedance of circuit on galvanometer side of barretter is high enough to be negligible, and that both are fed with same voltage.

From the equation it is evident—

(1) If r is small enough, R is the true impedance. In no other case is this so.

(2) In some cases R_0 will be small compared with the reactance, and then—

$$I^2 = R^2 + 2rR.$$

(3) By varying r and taking (two) readings it is possible to eliminate I and obtain R_0. Thence the impedance and inductance can be obtained.

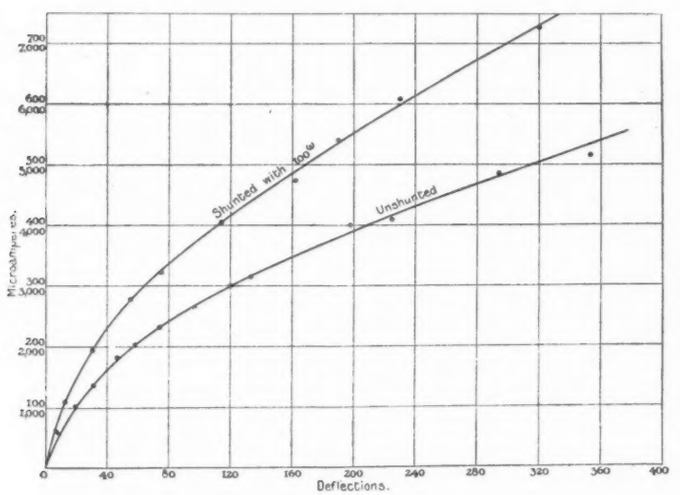


Figure 14.

By taking $x r_1 = r_2$, then—

$$R_0 = \frac{R_2^2 - R_1^2 + 2r_1(xR_2 - R_1)}{2r_1(x - 1)}$$

Condenser Measurement.—In this case the same formula will hold, R_0 being the effective insulation of the condenser. It includes dielectric losses. As a rule these are negligible, and we get—

$$I^2 = \left(\frac{1}{cp}\right)^2 = R^2 + 2rR.$$

Deflectional Use.—In this method only one barretter is actually used, the other being merely left in the circuit to balance the one used, both for atmospheric temperature variations and for resistance. One of the barretters is inserted in the circuit in which the value of the current strength is required, and the change in its resistance due to this current causes the galvanometer to deflect. The instrument then becomes practically a hot wire ammeter. It has this disadvantage that it is somewhat difficult to calibrate. The simplest method of calibrating is to pass an alternating current through the barretter in series with a known variable resistance, and measuring the potential difference across the latter with an electrostatic voltmeter. Figure 14 shows such a calibration curve. It will be seen that 60 micro-amperes correspond with ten divisions deflection (about 5 mm.). This is about the minimum measurable.

The sensibility of the barretters used in relation to telephone currents is such that fairly small non-inductive shunts

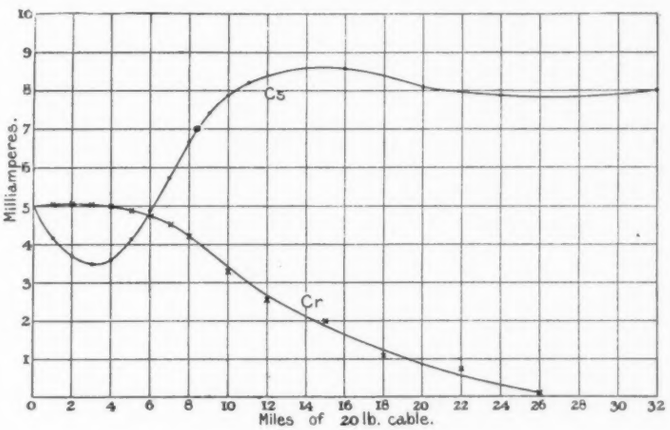


Figure 15.

can be used to eliminate the effect of the barretter impedance.

When testing telephone lines, ordinary telephone repeating coils, etc., can be inserted in order to give the ordinary terminal conditions met with in practice.

Duddell's thermo galvanometer has been used for current measurements. It has many advantages, and for deflectional methods is probably unrivalled if the source of power is absolutely steady, but it cannot be satisfactorily employed with transmitters in circuit owing to their variability, even although the sound impressed is quite steady. The barretter is somewhat better for this purpose, as the mass of the filaments employed is greater than that of the heaters used in the thermo galvanometer of the same rela-

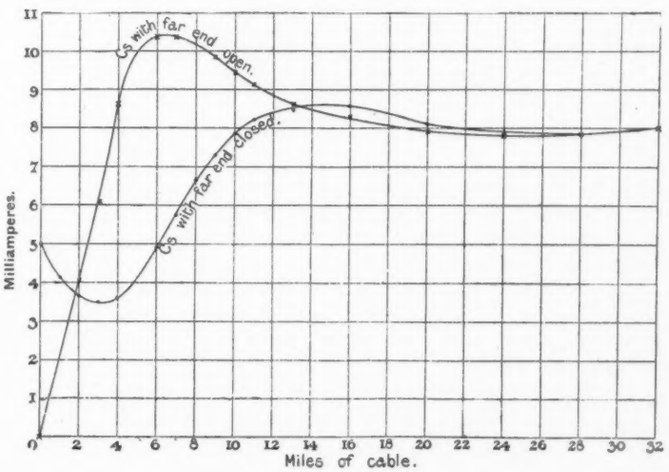


Figure 16.

tive sensibility, and consequently the time of response to a current variation in the thermo galvanometer is smaller, and the sensibility to momentary disturbances thus much greater. This comparison, of course, only refers to the actual apparatus employed, and it should be quite possible

to alter the time of response of the thermo galvanometer, and thus reduce its sensibility to small disturbances. Some of the measurements referred to later have been made with the thermo galvanometer.

The relationship between the currents Cs and Cr at the beginning and end respectively of different lengths of telephone line can be readily measured with two barretters. As mentioned before, the relationship is complicated by the addition of terminal impedances at either end of the line. Figure 15 shows this current relation plotted for various lengths of 20-lb. conductor cable equipped with ordinary telephone instruments at either end.

It will be seen that up to nearly six miles the received current is greater than the sending current. At about twenty miles the sending end current, which has up to this length been mostly increasing, has practically reached a constant figure, and is after this very little affected by any further increase in the length of line.

The necessity for allowing for the action of the terminal apparatus is well emphasized by these curves.

Figure 16 shows the relationship between the current at the sending end of the line when the receiving end is open and closed for various lengths of line. The cable line used in this case had 20-lb. conductors, and the line was terminated as before at either end by ordinary telephone instruments.

It will be noticed that at about twenty miles and upwards the current flowing into the cable is practically unaffected by the opening and closing of the receiving end, and that this also happens at about two miles. The current used for the above tests was at 800 ∼ and practically sinusoidal in form.

The determination of damping constants on 20-lb. cable was made by actuating an ordinary telephone transmitting circuit by a steady musical note, and then observing the ratio of sending and receiving currents on a varying length of cable, which could either be shorted at the far end, or closed through a known impedance. The appended table shows the relation found between the actual Cs/Cr, and the hyperbolic function cosh (la), which is the calculated ratio of Cs to Cr.

Miles.	$\frac{Cs}{Cr}$	∼	Cosh (la).	Error.
		Far end short circuited.		
5	1·065	792	1·0287	—3·5 per cent.
10	1·385	783	1·3740	—0·8 "
15	2·310	763	2·3100	0·0 "
	Far end closed through impedance			22 ohms 0.15 henry.
10	1·302	792	1·2400	—4·8 per cent.

Considering the irregularity in wave-form of a microphone produced current, the agreement between theory and practice is very fair. The telephone currents actually used were of the order of those commonly observed on standard common battery junction circuits.

By roughly balancing up a treble C singing note sung into a transmitter against a sinusoidal alternating current of similar frequency placed direct on the junction at the transmitting end, and then measuring the latter current on the thermo galvanometer, a general idea of the magnitude of the talking current is obtained.

At the sending end of the line and at the junction side of the repeating coil, a current of about five milliamperes and a potential difference of about 3.5 volts was observed. In the receiving instrument secondary, about 2.4 milliamperes with ten miles, 0.53 milliamperes with thirty miles, and 0.24 milliamperes with forty miles of 20-lb. cable, were measured. There were local subscribers' loops of 150 ohms resistance in connection with the above circuit.

Considerable difficulty has been experienced in obtaining a steady sinusoidal current of the frequencies required for telephone measurements.

Arrangements depending on the reaction of transmitters and receivers have been tried, but without satisfactory results, as the waves are not by any means sinusoidal, and it is impossible to obtain the requisite steadiness. At present there appears to be no machine of a reasonably small size on the markets for which the makers will give a sufficiently definite guarantee at the frequencies required.

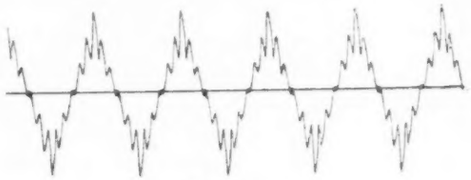


Figure 17a.

As an example of the difficulty experienced, Figure 17A is an oscillogram taken with such a machine of the wave-form on a non-inductive load. The suppliers were under the impression that this machine would give a closely sinusoidal wave-form. The machine used at present is a small inductor alternator, having an armature built up of ordinary slotted stamping, and gives a frequency of 800 ∼ at 960 revolutions per minute. The output is small, but the wave is a very fair one, considering that no special shaping of the

Figure 17b.

teeth was attempted. Figure 17B is an oscillogram from this machine.

In order to purify the wave-form for very precise measurements the peculiar property of the periodic loaded line already referred to and mentioned by G. A. Campbell in his paper on loaded lines has been utilized. By building up an artificial line, consisting of four or five sections, each associated with a condenser, inductance and resistance coils, it is found possible to practically abolish all upper harmonics and to leave the fundamental frequency desired. A wave filter of this description requires no tuning, and is safe over a considerable range of frequency, but naturally introduces a certain amount of loss.

The measurement of the energy absorbed by telephonic apparatus under working conditions presents considerable difficulty. The amount of energy is frequently exceedingly small, perhaps a few microwatts only, and is always a very variable quantity. At the date of writing this paper we are unaware of any instrument directly indicating small fractions of a watt, which could be included in the receiver cricuit of a telephone without radically changing the circuit conditions. An ironless two-coil wattmeter of the requisite sensibility offers a series impedance of many thousand ohms and is, of course, quite inadmissible on that account. A thermal method seems to be the only alternative, and the hot-wire voltmeter method, due, we believe, to M. B. Field, was employed with some success. The connections are shown in Figure 18. The instrument used to indicate the vector sum and difference of potential was a Duddell thermo galvanometer, operating with a 100-ohm heater. As only one such instrument happened to be available, it was necessary to employ a reversing switch to change the sense of the potential difference component. Switching arrangements were also provided to permit of current and potential difference measurements to be made independently, and to calibrate the galvanometer when required, by continuous current. Some difficulty was experienced in finding a suitable transformer for this work, pre-

sumably on account of complications occasioned by iron losses at the moderately high frequencies used to imitate speech currents, and also by variations of transformation ratio. An air-core transformer would probably have been a cumbrous and costly piece of apparatus, for it had to be borne in mind that, as the secondary winding was across the telephone circuit, a high inductance was imperative. A toroidal coil having a core composed of iron wire of about No. 40 S. W. G. was finally adopted. The dimensions of this core were approximately 11½ cms. external diameter, sectional area 7 sq. cms., depth 5 cms. The two windings had about 2,000 turns and 100 turns respectively, and the ratio of transformation experimentally determined ranged from 96.5 to 19.3, according to the number of secondary turns employed. A series of preliminary tests was made with the above described combination, using artificial loads made up of known non-inductive resistances, capacities, and inductances; and the results, though not of a very high order of accuracy, were yet encouraging when the difficulties were considered. The thermo galvanometer, as mentioned previously, when worked up to its greatest sensibility, was found to be extremely sensible to outside disturbances of various kinds, and much trouble was experienced from leakage and capacity currents in the test circuits. When the frequency is even no higher than 800 ∼ the term "non-inductive," as usually applied to resistances, requires qualification; and unless care be taken very erroneous conclusions may be arrived at. Some results using this apparatus are appended:

Apparatus Tested.	Current.	Actual Watts.	Apparent Watts.	Power Factor.	Effective.		∼
					L.	R.	
C. B. Receiver	0·00595	0·00858	0·01435	0·600	0·0425	165	825
120-ohm Receiver	0·01160	0·02220	0·02930	0·760	0·0280	165	825
120-ohm Receiver and Induction Coil	0·00220	0·00139	0·00247	0·562	0·0650	227	825
C. B. Repeater, Type 25 C., with 150-ohm Subscribers' Line	0·00208	0·00149	0.00218	0·685	0·0660	320	800

Test of sending end impendance of 30 miles of 20-lb. paper telephone cable, far end open:

Current.	Watts.	Power Factor.	Phase Angle.	Impedance.	∼
0·00658	0·0163	0·71	44° 48′	552 ohms.	810

This is in good agreement with the theoretical estimate of the impedance of this class of cable, viz., 550 ohms and phase angle 45°. All the above-described tests were made with current supplied by the small inductor alternator previously referred to using its natural wave-form.

In these days of the sovereignty of the two-coil wattmeter one scarcely cares to mention the three-voltmeter method, but as a matter of fact this method was found very convenient for certain measurements of the efficiency of induction and repeating coils. The instrument used was an Ayrton-Mather electrostatic voltmeter having a readable range of about one to ten volts. By switching over quickly into the requisite position on the circuit quite consistent readings could be obtained.

An excellent point in favor of this voltmeter in connection with telephonic measurements is its negligible working current. It is a little disconcerting to find that the efficiency of conversation between the primary and secondary circuits of a telephone is of the order of one per cent, though when used as an ordinary transformer, at about 800 ∼ passing a current of a few milliamperes, the efficiency of the best type of induction coil is quite high, viz., about seventy-two per cent. The low efficiency in the former case is, of course, due to the large constant component of the current in the primary. A slightly higher efficiency was found for a coil of the toroidal pattern, but, unfortunately, improvements in the direction of a closed magnetic circuit have not so far proved feasible for induction coils.

We have also applied the three-voltmeter test to the determination of cable constants at working frequencies. This method of determination seems to have been used to some extent by Dr. Breisig, of the German Telegraphs, who, however, employed apparatus of a special kind to measure the phase of the entering current. In the experiments made

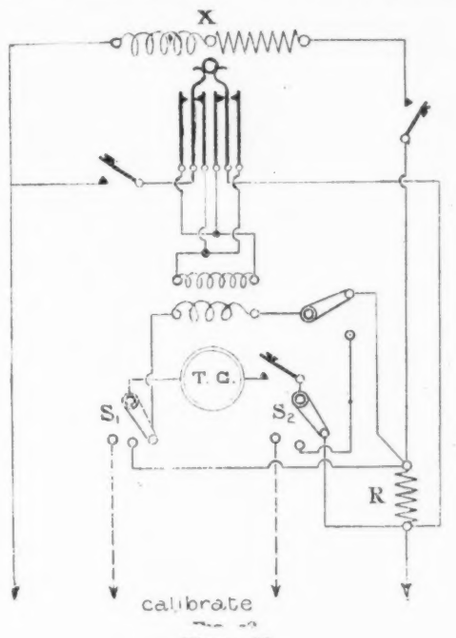


Figure 18.

in the National Telephone Company's laboratory the cable line to be tested was connected to the high-frequency generator through non-inductive resistances inserted in either leg, and the watts, current, and voltage observed when the distant end was open and when same was short-circuited. From these two sets of correlated readings the impedances at the sending end are specified completely as vectors, and thence the four constants R, L, S, and C may be deduced. As experiments in this direction are at present only in their initial stages, we are unable to say much about them.

Cables of the ordinary telephone types are notable chiefly for their high copper resistance, very small inductance, and high insulation; consequently the evaluation of the inductance and leakage constants depends on the possibility of very accurate phase measurements correct to a few minutes. This is a matter of considerable difficulty, and the examples given below must be regarded as trial endeavors:

Line.	Impedance.		R.	C.	S.	L.	∼
	End open.	End S. C.					
10 m. 20-lb. Standard	495−54° 20′	657−29° 18′	82·4	0·0540	7·12×10−6	0·00145	750
10 m. 20-lb. Artificial.	498−51° 28′	644−36° 6′	94·0	0·0624	—	0·00020	750

Currents used were from six to ten milliamperes with potential difference of two or three volts. The figures for resistance and capacity differ very slightly from what would be obtained by direct-current measurements.

The constants L and S in the case of the 20-lb. cable are possibly doubtful, owing to the phase-measuring difficulty referred to, but there is good reason to believe that there is a very considerable reduction in the effective insulation of paper cables at telephonic frequencies. It is hoped that further investigation will lead to more precise results.

The National Telephone Company was perhaps the first

in England to obtain any very accurate figures for the relative transmission values of various types of telephone lines.

A series of attenuation constants for all the types of lines in use in this country were calculated in July, 1904, from the now well-known formulæ, taking into account the resistance, capacity, inductance, and average leakage, and the results were embodied in a table of equivalents, taking a 20-lb. low-capacity cable as a standard. The results were experimentally verified in December and January, 1904 and 1905, the method for verifying being a simple one. This table of equivalents has already been published in Mr. Gavey's presidential address.

Talk is transmitted over two lines alternately, using the same telephone instruments for both lines, one of which is a variable standard line and the other the actual line under test. The variable standard, which in the laboratory is an actual telephone cable capable of being varied in length from 0.1 to 52 miles, and which for portable purposes consists of an artificial cable calibrated against the laboratory standard, is adjusted until the talk over both lines as judged by the ear is balanced, and the ratio of length of non-standard to length of standard gives the equivalent.

With practice, variations of very small fractions of a mile can be detected.

An endeavor has been made in this paper to apply to telephony the systematic methods of research and investigation which have practically developed the heavier branches of electrical engineering into exact sciences. The subject is a large one, the conditions generally exceedingly complex and variable, and the literature dealing with the experimental side decidedly scanty. Of mathematical discourses on wave propagation in cables, etc., there are plenty, but of a nature which does not appeal to the engineer. Prof. Kennelly has so far perhaps made the most practical effort to grapple with the theory, and all interested in this form of alternating current transmission owe a debt of gratitude to him.

SIMULTANEOUS TELEPHONY AND TELEGRAPHY

The Second of a Series of Articles on a Most Important Branch of the Science

By Francis R. Hoyt

THE repeating coil simplex as explained in the last article, adapts itself more readily to small plants where the volume of telegraph business is not great enough to demand more than one telegraph message per pair of telephone wires. In cases of greater demand some other form of telegraph circuit must be used, arranged so that a simplex, composite, or if necessary, a polar duplex can be immediately set up and put into practical operation without any change in the ringing circuits of the switchboards. That is, there must be a conformity not only of apparatus, handling, etc., but conformity of operation. As this operation means practically the ringing by operators over these lines, every line should itself control the ringing current it is to furnish at the distant end, and should do so without the operator's knowledge. From this we can see that in cases of composite and polar duplex circuits where high frequency ringing current must be used, the simplex circuit to be used in conjunction with these should also use high frequency current not only in order to keep the test panel as near uniform as possible, but because the cost of installation is no higher, the ringing can be done at a much greater distance, and the efficiency is if any thing, slightly improved. As was stated in the previous article, a repeating coil to be of practical use in simultaneous work must adapt itself readily to both ringing and talking; and as any transformed energy must undergo a transformation loss, it is plain that when the repeating coil is taken out of the talking circuit the transmission will be improved. This must not be taken to mean that it is not possible to ring through a repeating coil of this kind with high frequency current; the fact is that using high frequency current on a repeating coil simplex will improve its ringing capacities.

A simplex circuit using the retardation coil was shown at Figure 3 (first article). The only objection that can be offered to this circuit is that it can not be used without a composite ringer, or in other words without a high frequency current for ringing; but as this circuit was designed for use in connection with composites, polars, etc., as explained above, this is immaterial.

Figure 5 was a sketch showing the theoretical operation of the retardation coil simplex, and clearly defined the fundamental principle that one may telegraph through an impedance but not through a condenser, and telephone through a condenser but not through an impedance. The retardation coil used in this circuit has 1,000 ohms resistance and a very high coefficient of self induction, so that the rapidly vibrating voice currents traveling over the metallic line circuit pass through the condensers and into the switchboard and

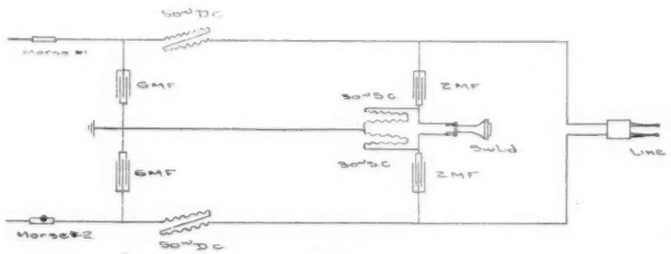


Figure 7.

vice-versa, without attempting to thread the retardation coil. A current of very high frequency will always take a path of ohmic resistance in preference to a path of self induction. Probably the most confusing terms used by the practical telephone man are self-induction and impedance. In simultaneous work especially these terms should be clear to all who have occasion to use them; but unfortunately, like all other theoretical phrases and branches of our business, these terms have been shrouded with mystery, and seem to be beyond the comprehension of the practical electrician. In reality they are very simple, and in this case the whole confusion has been caused by the name given the coil (impedance) which is representing a self-induction unit and not a unit of impedance. For, to be absolutely correct, impedance means, "any opposition to current flow," the theoretical definition of which is, "a quantity expressed in ohms equal

to the square root of the sum of the squares of the inductive resistance of the circuit and the ohmic resistance," or to use plain terms it is the sum of the ohmic resistance and the spurious resistance of a circuit expressed in ohms. From this it can be seen that if we had a circuit in which there was a condenser, a non-inductive resistance, an inductive resistance and any other resistance offering devices, we could calculate the ohmic resistances of them all, add them and say the impedance of the circuit was of certain amount, expressed in ohms. If alternating current was applied to this circuit (the terms self-induction and impedance never being used except where an alternating or an interrupted direct current

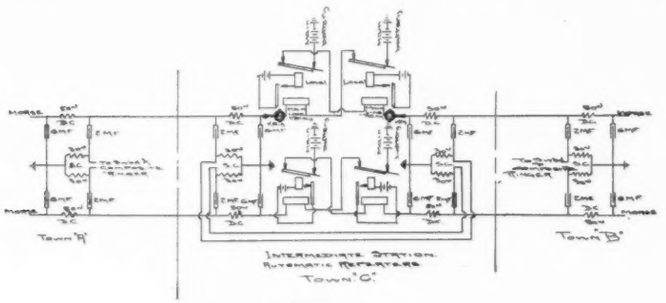


Figure 8.

is concerned) we would find that there was more retarding effect in the inductive coil alone, than in all of the other branches together, which goes to show that the impedance effect is nothing more than the ohmic resistance of the circuit, while the real opposition is in the self-induction of the so-called impedance coil. Self-induction means, the induction of a circuit or coil on itself and should always be expressed in henrys (the unit of self-induction). A peculiarity of the impedance coil is that the opposing power is instantaneous, that is, it is at its full value at the same moment that the impressed current is started or stopped.

So then when it is said that the high frequency voice currents will take the path of the greatest ohmic resistance in preference to a path of any self-induction, it is meant that the voice currents will take the path of the line, condensers, etc., instead of trying to enter the retardation coil. While this coil has a very high resistance, in most cases it is very small as compared with the resistance of the line.

The resistance of a condenser to an alternating current of any known period can be calculated by a very complex formula which it is not necessary to consider here, but it might

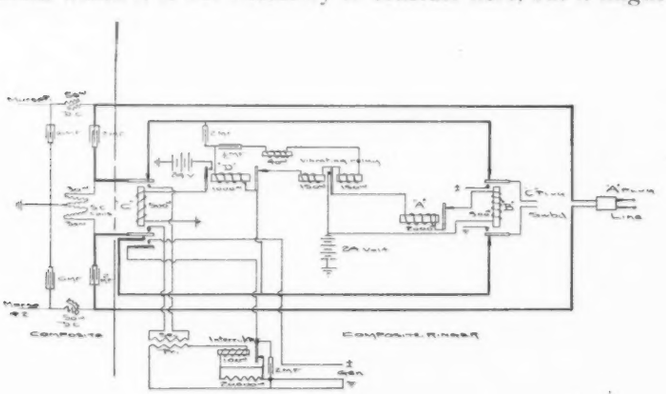


Figure 9.

be added that an ordinary two microfarad condenser with a ringing machine as mentioned in the first article offers a resistance of close to 500 ohms and a standard one microfarad condenser in the same circuit would be about 1,000 ohms. As the resistance of a condenser decreases as the frequency increases, it follows that this same condenser in a talking circuit would offer resistance so very low that it would not prove detrimental to the transmission.

From these explanations of the fundamental principles we can understand just how it is possible for telegraph impulses to be sent over wires carrying a telephone message, and all the elaborate systems are based on these simple foundations.

In the circuit shown at Figure 5 the conversation is carried on from the switchboard circuits, wiring, apparatus, etc., shown on the drawing by a receiver, through the condensers past the retardation coil and out over the line to the distant end suffering loss only by the ohmic resistance of the line plus the switchboard wiring. It is not made noisy or in any way interrupted by the telegraph impulses, as they are prevented from flowing into the switchboard by the condensers, which being exactly equal on both sides of the line circuit do not produce a flow of any kind. This is a good example of the wheatstone bridge principle referred to before.

Figure 7 shows a composite circuit, from which we derive two telegraph circuits and one telephone communication from one metallic telephone line, the only difference between this and the retardation coil simplex last explained being that in this case each side of the line is used independently of the other for a telegraph message which is made possible by the use of condensers. Of course the apparatus used in this circuit is somewhat differently arranged and of different values, but the principle upon which it is based is exactly the same as that of the simplex circuit.

In Figure 7 the two telegraph circuits are represented by the words "Morse 1 and Morse 2," the switchboard ap-

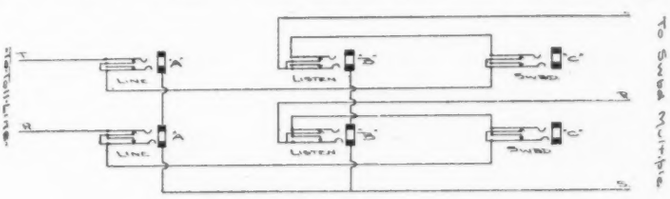


Figure 10.

paratus by the receiver, and the line by that name. There will be noticed in front of the retardation or impedance coils the letters "D. C." and "S. C.," which mean respectively differentially connected and serially connected. There are two each of these coils, two being bridged directly across the talking and ringing circuit and two being in series with the telegraph taps. The two serially connected coils offer the greatest amount of self-induction to the talking currents and are put in the circuit purely for balancing purposes. A ground tap is introduced between the coils which tends to quiet the line at all times, yet these coils offer enough retarding effect to the talking currents to prevent any loss through them to ground. The differentially connected coils do not impede the talking currents quite so much, but the effect is great enough to prevent any loss in them, and not sufficiently great to raise the self-induction to such a point that it will interfere with speed in signaling on the telegraph. That is, if the self-induction of the coils were too great the counter electromotive force, which as explained before is always at its full value at the time of making and breaking the circuit, would oppose the current flowing to such an extent that the speed of the telegraph impulses would be affected.

The two microfarad condensers prevent the discharges of the telegraph key from flowing back to the switchboard, and the six microfarad condensers act as static collectors, that is, they reduce the static capacity of the line by offering a by-path through them to ground, which also tends to quiet the line.

We can now follow the transmission circuit from the point shown by the receiver. The talking currents originate in the switchboard circuits, flow out to the serially connected retardation coils without attempting to enter them, through the two microfarad condensers, and take the path of the line

in preference to flowing through the differentially connected coils and telegraph relays to ground. In order to find the origin of the talking currents it is necessary to continue the circuit from the part marked "receiver" in Figure 9. As the same pair of wires used for the voice currents must also control the high frequency ringing current it is obvious that at this point in the circuit, between the line and switchboard apparatus, is the proper place for the installation of the composite signaling system. This is a series of apparatus as shown in Figure 9, which can be applied to any composited circuit to allow the use on such a circuit of the regular seventy-five volt ringing current. This is accomplished by transforming the regular grounded ringing current to a metallic high frequency current at the calling end which, being carried to the distant end, actuates such apparatus as will cause the regular ringing current at that place to set the signal.

For each composite line or line requiring high frequency ringing there must be one of the circuits shown at Figure 9, complete, with the exception of the relay and apparatus marked "interrupter"; which can be used in common by five circuits, but should never exceed this number.

The operation of the composite signaling system is as follows. When a ringing key at the calling switchboard is depressed the generator current flowing out operates the ringing relay *D* also at the calling end. This cuts the vibrating relay off and closes the twenty-four volt battery circuit through the *C* relay, which, when it operates switches the line for the switchboard side to the terminals of the inter-

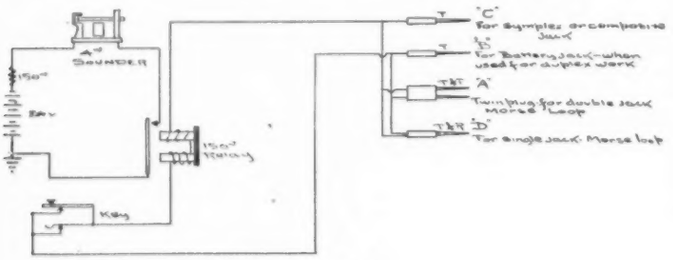


Figure 11.

rupter, which is also put into operation by the outside contracts of the *C* relay. The high frequency current generated by the interrupter and sent over the line operates the vibrating relay at the receiving end, thus opening the twenty-four volt battery through the *A* relay, which on dropping back closes the battery circuit through the relay *B*, and opening the line from the switchboard side throws the central office generator of the receiving office onto the switchboard circuits and operates the signal.

The following is a general description of each piece of apparatus in both the composite and composite signaling systems.

The retardation coils are shown at Figure 13. The serial and differential effects are gained by a difference in strapping as shown. The core is made the same as the core of the repeating coil explained, in the first article, except that there is a large amount of iron in it, and a great number of turns of copper wire, in fact, about three times as much as in the repeating coil and of wire about six sizes larger. From the explanation of the repeating coil it can be understood why the coils are made in this way.

The two microfarad condensers are ordinary condensers made of tinfoil, dexter paper and paraffine, with an insulation resistance of thirty megohms, to stand a break down test of 500 volts.

The six microfarad condensers are simply three two microfarad condensers strapped together in parallel.

The *A* relay in the composite ringing circuit is an outside contact relay, of very high resistance because the battery is closed through it all the time, and if the resistance were lower it would consume too much current. A part of this resistance is German silver wire added for this purpose.

The *B* relay is an ordinary make-and-break type.

The *C* relay is exactly the same as the *B* relay with two outer contacts added.

Relay *D* is a ringing relay, that is, it is a slow acting relay with very little tension on the armature. A part of this winding is also of German silver wire.

The vibrating relay is a polarized relay with the armature mounted between the two cores as shown, each coil wound

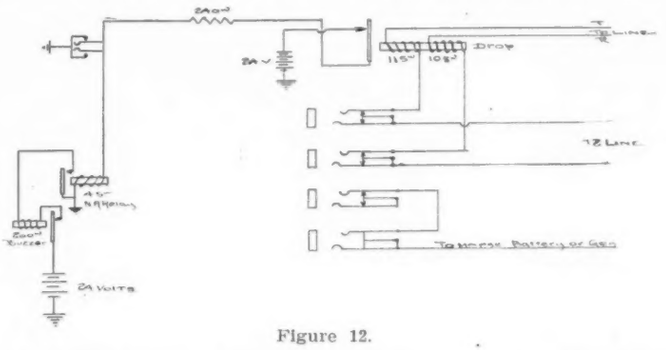


Figure 12.

with copper wire to a resistance of 150 ohms. As a result of being polarized it is not subject to alternating current impulses, and can only operate on the high frequency current which has a constant polarity. The action of the relay is to draw both parts of the armature towards their respective cores and thus open the made contact.

The interrupter is of the buzzer type, set into operation by the alternating current, which is interrupted at a great frequency and sent out on the line through a transformer (step-up) with a ratio of about two to one. The transformer, however, is used mainly to convert the grounded generator to a current free of a ground. There is a resistance of 20,000 ohms bridged around the buzzer to prevent sparking at the contacts, which can be made either of graphite or German silver.

The ringing current in operating the *D* relay flows through the two microfarad condenser and relay, but is of too low a frequency to force its way through the one-half microfarad condenser and impedance coil to the vibrating relay to any extent. The high frequency current on the other hand prefers the path of the condenser and low impedance coil through the vibrating relay, to the self-induction of the 1,000 ohm relay; but on account of the sluggishness of this

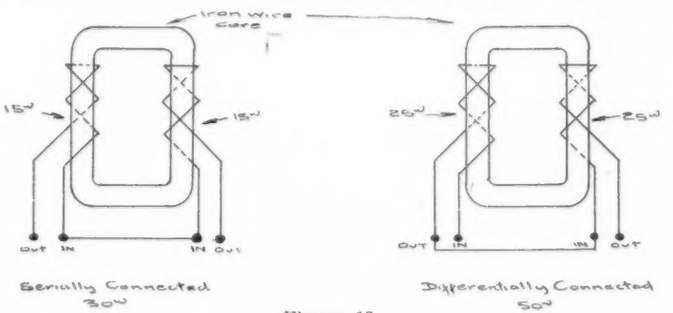


Figure 13.

latter relay it would not operate even if the full current was spent there.

The composite telegraph and composite ringer circuits are wired to the wire-chief's desk and plug-ended as shown. In this way they can be immediately put on any line in the office, as each toll line comes through the toll test panel in the circuit shown by Figure 10. In order to put the telegraph on this line the plugs marked *A*, Figure 9, are inserted into jacks marked *A* on Figure 10, and the same with the plugs and jacks marked *C*.

In order that the wire-chief can thoroughly test these lines

his desk is wired with circuits as shown in Figures 11 and 12. In this way, if he wishes to plug a telegraph tap through his office, or out to some subscriber in town, he can do so by putting the Morse plug (Figure 9) of the composite, into the jack of the subscriber and furnishing battery at the subscriber's station; or he can bring the subscriber's station back to his desk on a loop circuit and furnish the battery through a patching cord to the battery jacks. This is all shown by the jacks 4, 3, 2, 1, respectively, Figure 12.

Figure 11, shows the wire-chief's telegraph circuit. This is so arranged that he can cut any line or lines through his instruments and monitor them, or he can get in on any line and test; the drawing is self-explanatory.

The following are a few notes well to remember:

An interrupter for high frequency should give at least 300 pulsations per second.

The operating current of a standard 150-ohm morse relay is four one-hundredths of an ampere.

Telegraph potential should be five one-hundredths of an ampere at each end of the line.

A standard morse relay with the armature in contact with the cores has a self-induction of about eight henries.

Increasing the number of composite sets in series decrease the speed of signaling.

A short method of figuring the number of gravity cells necessary (when they are used) on telegraph lines, to give the proper operating current for the relays, is to simply divide the total resistance by twenty-three. The result obtained is the number of cells necessary.

For the number of cells necessary to operate four ohm sounders, divide the total resistance by two.

The electro-motive-force of a gravity battery is one and seven hundredths volts; the internal resistance two ohms.

THE CHEMISTRY OF INSULATORS

Some Characteristics of Materials Commonly Used in Telephone Work

By L. B. Hall

TO THE average person unfamiliar with the inside operation of a telephone manufacturing plant, work of a chemical nature would appear to be confined mainly to preparing solutions for factory use. This view is far from right. The real work required of a chemist, with the exception of anything of a special nature that might arise, is the examination of the raw material used in the manufacture of the product. The expression "raw material" does not necessarily mean crude or rough, for what is raw material to the telephone manufacturing company may be a finished article to the steel manufacturer, the paper manufacturer, or the smelter and refiner. The examination of this material may necessitate a complete chemical examination, or oftentimes simply determinations of certain substances that are known to be injurious to telephonic work. It is the purpose of this article to show the quality required of these materials and the properties that make them valuable to this industry.

The only insulating material used in aerial and underground cables is paper, and obviously it must be of a very good quality to insure its most useful properties—strength

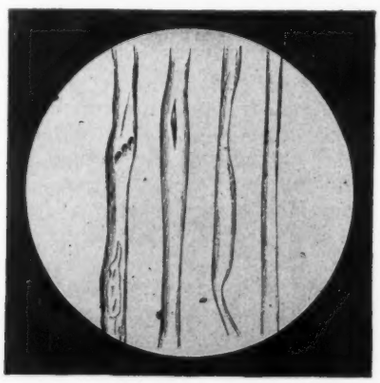


Figure 1.

and insulation. The kind manufactured from Manila hemp has been found to be the best for this purpose. This paper is generally prepared by treating the pulp with sulphuric acid or bleaching powder, or both. These chemicals have a corrosive action on metals and are conductors of electricity. Hence, paper containing more than minute traces of them

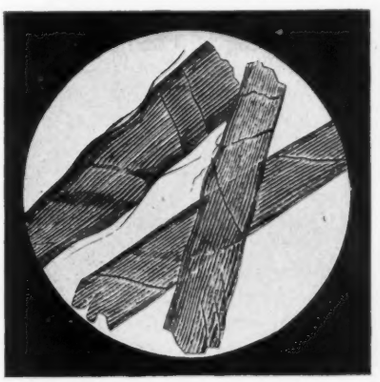


Figure 2.

would be worthless for insulating purposes. Sodium chloride or common salt is oftentimes detected in samples of paper. This substance indicates that the manufacturer, in washing the pulp to remove the chemicals used in its preparation, has used either ocean water or water contaminated with sewerage. All insulating paper should be thoroughly tested for these agents and the paper rejected if it contains any.

The sheath is made of lead or of a lead-tin alloy. These metals, purchased in the ingot form and direct from the smelters and refiners, are practically pure. Lead which has been previously used, such as one would likely get in purchasing of a small dealer, generally contains small quantities of other metals, also lead oxide. This latter tends to make the metal brittle and thus impairs the cable. Lead which meets specifications requiring a purity of 99.8 per cent is pliable, malleable and slightly ductile.

Lead is an easily oxidized metal. When a piece is cut with a knife a bright clean surface is exposed, but this soon becomes dull or iridescent, due to the oxygen of the air uniting with the lead in chemical combination. This would soon ruin the metal if it were not that the first layer of oxide acts as a protection from further corrosion.

The idea of alloying tin with it is mainly to produce a

tougher and more durable sheath. But it also tends to keep the sheath bright. Tin is very inactive chemically, both in dry and moist air, and for this reason it is valuable for coating iron to make the so-called "tin" articles. Cable sheath containing three per cent of tin, under ordinary conditions, will keep bright for a number of years.

The best copper conductors are made from the purest commercial metal, which is the product of refining by elec-

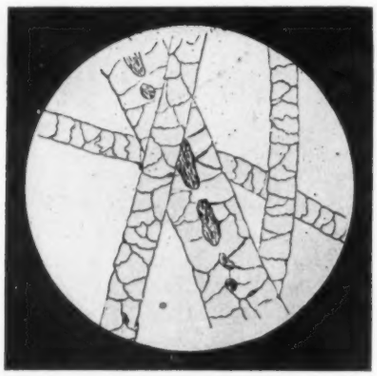


Figure 3.

trolysis. This process insures a grade that is practically 100 per cent. The wire should be tested electrically, and if found satisfactory, consigned to stock; if not, a chemical analysis made, the impurity determined, and the wire rejected. Copper is another oxidizing metal, but as in the case of lead, the action is only on the surface, provided moisture is excluded. When moisture is present the metal gradually turns to verdigris, but in the moisture-proof lead sheath this is impossible.

Sometimes it is necessary to use a cable where the atmospheric conditions are unnatural, such as near acid factories, freight yards, etc. In such cases it is customary to cover the sheath with some substance that is impervious to the fumes in the locality. A braid of cotton thread impregnated with asphaltum paint has been found satisfactory for this purpose.

Four different kinds of yarns or threads are used in this industry, silk, wool, cotton and linen. All are invaluable for their peculiar purposes, and attempts to find substitutes have been futile. They are all organic substances; silk and wool are of animal origin, while cotton and linen belong to the vegetable kingdom.

There are two kinds of silk suitable for insulating pur-

Figure 4.

poses; Italian Tram or "cultivated" silk and Tussah or "wild" silk.

Under the compound microscopic the fiber of the "cultivated" silk appears as a structureless, transparent and nearly cylindrical rod (Fig. 1). The average diameter is about .0007 inch. It is the simplest and most perfect of fibers.

This silk is an excellent insulator and is used in the manufacture of the best quality of magnet wire. It is very expensive, costing about nine dollars per pound. Many attempts have been made to load it. Some of the substances that have been detected as adulterants are oil, gums, metallic salts and ground glass.

The Tussah silk, which is used as an insulator in switchboard wire manufacture, presents a far different appearance under the microscope. The fibers appear to be composed of bundles of smaller ones as shown by parallel longitudinal lines (Fig. 2). There is also a slight cross structure. The diameter is much larger than that of the tram, measuring about .002 inch.

Tussah silk containing a small percentage of oil, seems to run better on the insulating machines than that containing none. Specifications may allow three per cent, but the dealers have often attempted to add more; in one instance fifteen per cent was detected.

The spun or organized silk is usually made from the waste of the tram. The tram fibers are spun into ends and these are twisted into threads. It is used for covering telephone and receiver cords.

Wool, as is well known, is the hair of the sheep. It is not used to a great extent in this business, but it is valuable for one purpose—covering cords and cables that are intended for use in damp places. It has an affinity for oil (four per cent allowed) and consequently repels moisture. The fiber proper is cylindrical and covered with minute overlap-

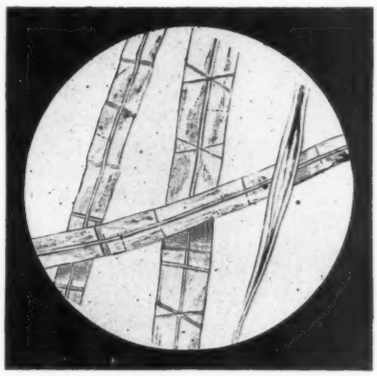


Figure 5.

ping scales (Fig. 3). It has a characteristic crimp. In diameter it measures about .0024 inch.

Cotton, on account of its attraction for moisture, is of little value as an insulator, but is used to a considerable extent as an outer covering for switchboard wires, cords and cables. The cotton for cords is usually starched to render it smooth and more durable.

The fiber is very characteristic. It is a semi-transparent, flattened and collapsed tube slightly twisted in spiral form (Fig. 4). Its diameter ranges from about .0005 to .0015 inch.

The laboratory testing of cotton involves chiefly the determination of moisture and starch. The average sample contains about six per cent of the former, the latter is limited to not over five per cent. Samples have been submitted which contained as high as ten per cent of starch, but these were no doubt purposely loaded.

Linen, in exceptional cases, is used as a covering for switchboard cords. It is tough and glossy and makes an excellent covering, but extensive use is prohibited on account of the cost.

It is spun from the bast fibers of the flax plant. Microscopically it appears as transparent, cylindrical tubes regularly built up of cells that show divisions of the fiber. (Fig. 5). These divisions or nodes are characteristic of linen and an easy means of detecting it from silk and cotton. Its diameter averages about .0007 inch.

THE ALDERMAN AND THE COMPANY

By H. S. Grant

WHEN the alderman comes in to see the company, the company is up against it and knows it. It doesn't make any difference what the alderman wants, he wants it bad, and in order to side-step him, the manager has got to be a toe-dancer.

The other day an alderman came into the office who, three weeks after his election, scornfully repudiated the charge that he would take anything from a corporation without paying for it. Now, nearly six months after his election, he was trying to find out in a gentlemanly way so as not to hurt the company's feelings, why he was being discriminated against when all his colleagues were being given free telephone service. The manager told him that it was far from the company's intention to discriminate against him, and he would be glad to see that the honorable alderman's name was put on the dead-head list. That was before the anti-pass law. Now things are different.

Not so long ago a fine example of the iron hand in the velvet glove was seen when one of the operators was discharged for the good of the service. She was a very popular young lady and had an engagement for a dance or a party about three nights a week. About three days a week she would turn up at the office missing and her work would have to be divided up among other operators. The popular operator gave one excuse after another for her absence, but finally got to a point where she had to begin repeating them. That is where she made her mistake, and the traffic manager, who had been doing a little detective work, told the popular operator that three days a week was not near enough time to rest up in, and in order that she be able to do her work well, she had better take four days more. This caused a good many tears to flow from the popular operator, but without success.

The next day an alderman dropped into the manager's office to find out why the daughter of one of his constituents had been so badly treated. He said the young lady was naturally delicate, and could not be expected to go to work after having been out to a dance the night before, and he felt sure that the manager could see the reasonableness of this. He said he knew the manager would be very glad to accommodate him in such a little matter as putting the delicate operator back to work, when his attention had been called to the injustice done her. The manager beamed with friendliness and replied that he would be only too glad to accommodate the alderman in such a little matter but that most unfortunately he had promised the traffic manager less than a week ago that he would allow no employe of the company to interfere with her department, and he disliked exceedingly to be the first to break the rule. Would not the alderman excuse him, just this time? The alderman was taken a little off his guard, and excused him before he had quite gathered up his faculties. As he left the office, the manager offered him a cigar and asked him to drop around again and he would be pleased to help him in every possible way.

It happens that in one of the wards of this city there is a large foreign settlement having about a dozen political leaders, and as each leader is at the head of a family of ten or twelve sons and daughters, the result is something like one hundred and fifty persons that the alderman of that ward takes an especial interest in seeing constantly supplied with work suitable to their delicate moral fiber. As the men are not adapted by nature to anything more genteel than shoveling, and as this is not consistent with their social position as the friends of the alderman, they have great difficulty in holding down a job for any considerable length of time, say for instance ten days. This fact makes the alderman of that ward a very busy man. He spends practically his whole time working in the interest of the city and keeping these sons and daughters in employment.

Now, the company has one of these sons in its employ, and his loyal friend, the alderman, drops in quite frequently to inquire if John seems pleased with the work he has to do, and hopes that he is not taxed beyond his strength. The manager assures the alderman that John is given the choicest jobs, but in order that no officious department head shall overburden John, he will issue a circular letter that very afternoon, describing and limiting the work that is to be given John, and instructing all John's fellow employes to greet him with a winning smile and a pleasant "good morning" when he arrives at work. The manager then praises the existing board of aldermen, and especially the alderman present, for the efficient work they are doing; and the company has won a powerful friend in the council.

It not infrequently happens that an alderman comes around selling tickets to a grand ball to be given as a benefit for the superannuated members of the Bartenders' Union or some similar organization. This is where the manager is certainly between the devil and the deep blue sea. In a case like this, after carefully examining every loophole, the manager has been known to buy half a dozen tickets and to promptly consign them to the waste basket after the alderman had left the office. This is what the alderman expects and desires him to do, because he has already sold tickets to three times as many people as the hall can possibly accommodate.

If the occasion is especially favorable for an escape, the manager explains to the alderman that it is with great regret that he is compelled to inform him that the president of the company is out of the city for a few days, and no one else has the authority to buy such things in the name of the company, but he is sure that the president will be glad to purchase a large number of tickets in order to help such a worthy cause if the alderman will kindly step around on the following Tuesday when the president returns. (The grand ball takes place Monday evening.) The manager further states that he would be glad to buy a ticket personally, except that he is going to take his sixth degree in the Masons on that date and would be unable to use it.

It is only justice to say that these cases are not fair samples of all a company's dealings and relations with the alderman. There are many aldermen who have insisted on paying for their telephone service, even though they knew that a great majority of the other aldermen were getting theirs for nothing, and that simply going to the company and requesting a free telephone was all that was needed in order that they have their own service free. Free telephone service was looked upon both by the company and by most of the aldermen, as only their due, and an alderman who refused it did so at the bidding of his own conscience. Strange to say, the aldermen who insisted upon paying for their telephone service, were the true friends of the Independent company. They insisted in doing right by the telephone companies and they insisted on the telephone companies doing right by the city. In the case of the Independent company, it had a president who was absolutely upright and honest, and this was appreciated by those aldermen who knew this to be true.

Manufacturer's Department

By W. H. Graffis

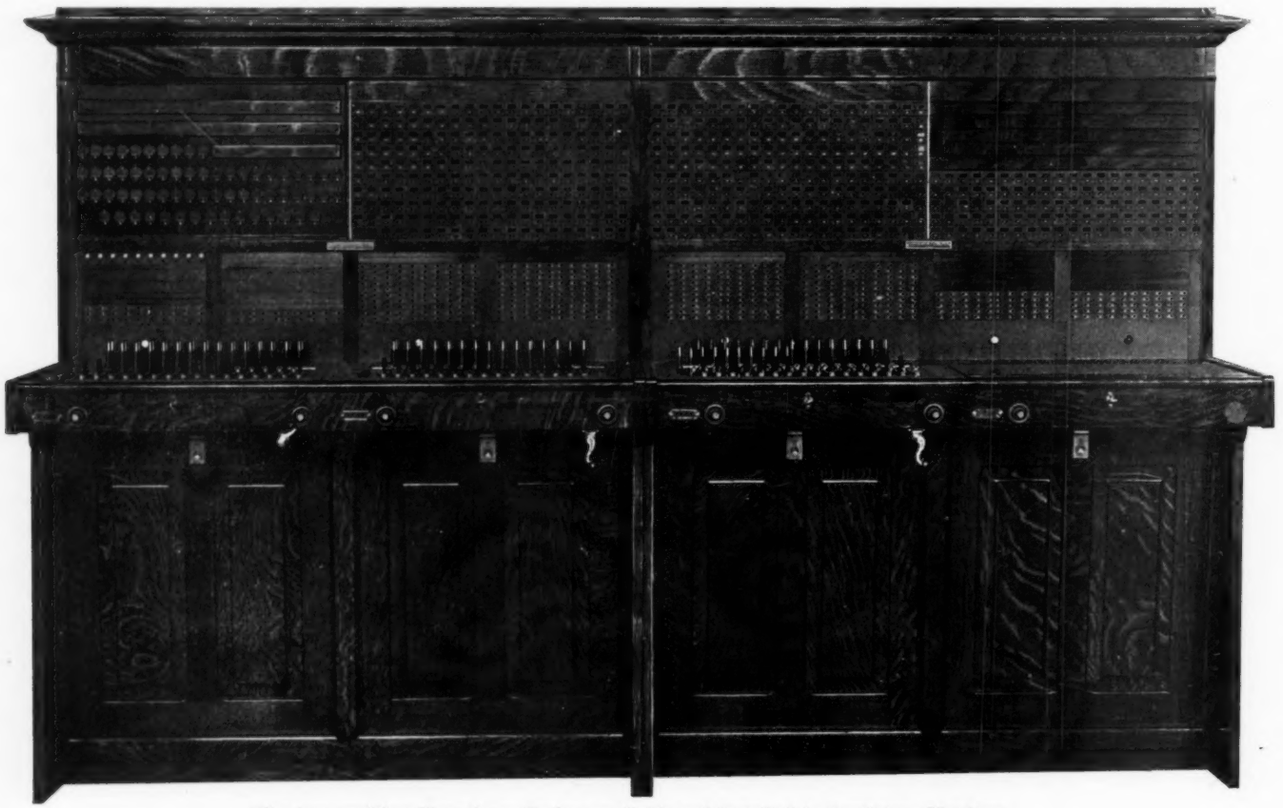
A TWO-POSITION SWITCHBOARD FOR LEWISTON, MONTANA.

THE Lewiston-Billings Mutual Telephone Company of Lewiston, Montana, has secured a very unique and practical central energy visual signal non-multiple switchboard, which has been manufactured for it by the Stromberg-Carlson Telephone Manufacturing Company, Rochester, New York.

The equipment which was required for this installation is mounted in two sections of A-1522 quarter sawed oak cabinet having a golden oak finish. The key shelves are of the regular five-ply construction and further protected from warping by steel straps embedded in their edges. Heavy belt leather and mottled tan leather cover the plug boards and pilot rails respectively, and removable panels are furnished below the key shelves back of the cords and also in the back of the sections, which is a feature that permits complete access to all the working parts of the equipment. Similar panels are also furnished in the lower sides of the section for permitting the running of cables from one section to the other.

Telephone men will find it interesting to observe keenly, with the assistance of the accompanying illustration how it has been managed to provide for the ultimate capacity for a switchboard of this type in two sections of cabinet having a maximum width of 96 inches and a maximum height of 77¼ inches. The ultimate capacity of this switchboard will provide for 600 central energy visual signal lines, 100 generator call tubular drop lines, 45 central energy to central energy cord pairs, 10 toll to toll cord pairs, 5 combination toll to central energy cord pairs, together with the necessary transfer and order wire equipment. This particular switchboard which is being installed at Lewiston, Montana, was equipped for the immediate operation of 500 central energy visual signal lines, 50 generator call tubular drop lines, 30 central energy to central energy cord pairs, 10 toll to toll cord pairs, 5 combination toll to central energy cord pairs, transfer and order wire equipment.

The regular central line equipments consist of self-restoring visual signals of the self-contained type, together with associated answering jacks. They are mounted on steel mounting strips in the upper compartment of the section. The corresponding answering jacks for these are mounted in strips of ten in the jack space immediately below the compartment containing the visual signals.



The two-position Stromberg-Carlson switchboard installed in Lewiston, Montana.

The generator call line equipments each consist of non-inductive tubular drops having a resistance of 500 ohms and are associated with double cut-off jacks in similar construction. The drops are mounted in the signal space in the upper part of the cabinet, and are provided with night bell contacts. A line pilot equipment consisting of a twenty-volt lamp behind the large opalescent diamond cut opal is furnished, as mounted on the rail below the jack space of each position.

The central energy cord pairs are equipped with individual ringing and listening keys, double lamp supervisory

signal and other associated cord apparatus. The combination toll to central energy cord pairs are equipped with individual ringing and listening keys, ring back keys, clearing out drops on toll end, repeating coils, condensers and single supervisory lamp signals on the central energy end, together with other associated cord apparatus. The toll to toll cord pairs are equipped with individual ringing and listening keys, clearing out drops, together with other associated cord apparatus. Each position is wired for an ultimate of twenty incoming transfers and twenty outgoing transfers with five order wire circuits.

The operator's equipment of each position consists of an operator's breast plate transmitter, head receiver and cord with plug attached. Below the key shelf and to the left, an operator's cut-in jack is mounted in the bar as usual. The night bell key is also mounted to the right of the cut-in jack, as is a generator switch to the right of the operator on this same bar. The operator's hand generator with a crank protruding from below the key shelf is seen to be mounted in the usual extreme right-hand position.

Position switching keys are also provided for and so arranged that adjoining positions may be placed under the control of one operator during the absence of either of the adjacent operators.

The Stromberg-Carlson Company will be pleased to send telephone men a full-size mounted photograph of this switchboard, who are interested in similar equipments and desire information in this form for their reference.

THE MOORE CALENDAR FOR JUNE.

TO SAY that the card calendar sent out by Alfred F. Moore of Philadelphia for the month of June is in every way the artistic equal of its forerunners is to leave little unsaid as to its beauty and attractiveness. Receiver cords form the subject of the interesting and convincing Moore talk this month:

"Do your receiver cords last as long as they should? Try ours and notice the difference.

"They will not kink and break in one place, for the construction insures uniform flexibility and an even distribution of wear.

"All the materials are carefully selected and combined to form a neat and dur- able cord.

"Any color or combination of colors in silk, worsted or mercerized cotton can be supplied promptly.

"Will you send your next order to us and prove their worth?"

A SUCCESSFUL TELEPHONE ENGINEER.

EDMUND LAND, telephone engineer, began his career in that field in the installing and maintenance departments of the Michigan State Telephone and Telegraph Company. After spending three years as assistant traffic manager he was given charge of toll and cable troubles and repairs in the engineering department. During this time he conducted experiments to determine the efficiency of battery cells, insulating material, etc., under various conditions.

Several subsequent years as a switchboard installer fitted him for a position as wire chief of the western division of Michigan, which he held until his resignation from the company in 1900.

From this time until 1907 he was engineer for the Citizens' Telephone Company of Grand Rapids. In this connection he became thoroughly familiar with automatic telephony, and applied for patents on several semi-automatic circuits and systems. He has particularly made a study of the possibilities of automatic equipment in handling traffic under modern conditions.

In January, 1907, Mr. Land resigned from the Citizens' company and is now engaged in general telephone engineering, development, plans, reports and appraisals. His office is 15 Jones building, Detroit, Mich.

A RINGER WITH AN UNIQUE BIASING ATTACHMENT.

FOR ordinary exchange telephone work the ringer, as a rule, is given very little consideration; but to meet the exacting requirements of heavily loaded rural lines and selective four-party line systems, it is of great importance to have a ringer of high efficiency, so constructed that it will permanently retain its adjustment when placed in proper working order. A scientifically designed ringer, with biasing attachment, is placed on the market by the International Telephone Manufacturing Company, Chicago.

New International ringer with biasing attachment.

The regular polarized ringer is so constructed that it may be changed to a biased ringer. In the accompanying illustration, it will be noted that the armature is provided with two notches in the back edge and two projections, *6*, upon the surface, located on each side of the pivot points. A properly shaped supporting arm, *7*, has a hook to engage the notch in the rear of the armature, and a hole which catches in the projection on the surface of the armature. The tension of the biasing spring securely holds the armature in place. The biasing spring supporting arm being constructed so that it may be conveniently moved from one side of the armature to the other, obviates the necessity of changing the electrical connections.

A long flexible spiral spring is used, giving the elastic tension necessary to satisfactorily operate the biased ringer. The end of the spring is connected to a special stamped hook, which is provided with a cross-piece on its free end. The cross-piece rests on a thumb nut, which is supported on a slotted screw adjusting post. The thumb nut is provided

with teeth on its surface that come in contact with the cross-piece of the spring adjusting hook. The thread on the slotted screw and the teeth of the thumb nut are graduated to give an adjustment of 1-1000 part of an inch, and the adjustment when made is self-locking.

The ringer itself is exceedingly simple in its construction and all parts are so arranged that they are easily adjusted and firmly held in position when in operation.

The armature support, *3*, which also serves as a means of adjustment for the armature, is made from phosphor bronze. The adjustment is varied by increasing or decreasing the spring pressure by means of a slotted hexagon head screw, *8*, threaded into a steel post. This construction forms an adjustment that is accessible and reliable. The adjusting screw admits the use of either a screwdriver or a pair of pliers for making the adjustment.

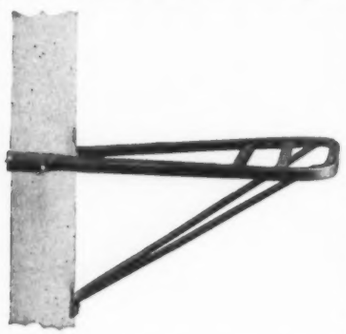
The cores, *4*, at the armature end, are provided with a shoulder upon which are mounted iron washers, *2*, forming a firm base for the armature support, thus relieving the fiber core heads, *1*, from all strain.

The permanent magnet is made from a bar of high-grade magnet steel larger than is customarily used in a ringer, and is firmly clamped with a heavy machine binding screw.

The cores and armature are made of Norway iron and are annealed by a special process, which entirely eliminates the sluggish action to which many polarized ringers on the market are subjected on account of residual magnetism. With this ringer any straight bridging telephone can readily be changed to a biased ringer party line instrument.

NEW BISSELL POLE SEAT.

IT HAS been said that nothing adds more to the appearance and efficiency of a telephone plant than neat cable poles and pole seats, and this important point of neat appearance and the essential point of safety were constantly borne in mind by the F. Bissell Company in manufacturing and bringing on the market the Security pole seat No. 2.



Believing there is no economy in wood seats—in seats with projecting iron slats which look rough, nor in upward-turned rims which make it impossible to sit and dangerous to stand—the manufacturers have avoided them. Neither have they cheapened its method of construction, and the same high grade of workmanship and material which has always characterized the Security products is found in this latest addition to the Security line of specialties. Security seat No. 2 has an angle iron rim hot bent—not notched—at the corners. This method of manufacture requires special machinery, but all the metal is preserved in a continuous rim of fine appearance and great strength is hereby secured. The cross slats are heavy and solidly machine riveted to the under side of the rim, leaving a smooth exterior. Pole braces are of angle iron and strength is of great advantage as cable poles are generally overloaded. Light weight, great strength, neatness and low cost sum up the points of merit of the new seat, it is said, and judging from the orders already secured from exchanges large and small, its success is absolutely assured.

MAX W. ZABEL OPENS OFFICES.

MAX W. Zabel, who has opened an office at 1362 Monadnock block, Chicago, for the soliciting of patents, trademarks and copyrights, is a graduate of the University of Wisconsin, having taken a diploma in electrical engineering in 1898. For three years he practiced patent law in Chicago very successfully, making many friends.

Becoming interested in telephone selective systems, he took up the promotion of a new and promising four-party system. The better to promulgate its merits, he entered the employ of the American Electric Telephone Company, and in spite of the suspicion with which selective devices were viewed at that time, he succeeded in placing it very prominently before the telephone public. The sales of this device have since become enormous.

Mr. Zabel became sales and advertising manager for the American Electric Telephone Company, serving in that capacity for seven years. During this time he invented and successfully marketed the well-known Zabel eight party selective system.

During this time Mr. Zabel was constantly identified with patent office work, and resigned his position to devote his entire attention to his chosen work.

Mr. Zabel is prepared to prosecute all kinds of patent, trademark and copyright work, interference cases, special investigations, and the engineering problems connected with such work. Special technical and expert reports will take a considerable portion of his attention.

A NEW SUPPLY COMPANY.

THE organization of the Telephone and Electric Sales Company, 606 Heist Building, Kansas City, places Norman Furst at its head. Mr. Furst is thoroughly familiar with the territory adjacent to the company's headquarters, having been connected with the sub-license department of the Missouri and Kansas Telephone Company, with the Western Electric Company as telephone sales manager, and with the North Electric Company as traveling sales representative.

Norman Furst, manager Telephone & Electric Sales Company.

The new company's attention will be devoted to the territory of Missouri, Kansas, Oklahoma and Texas, handling a complete line of high-grade telephones, wire, pole line hardware and other materials and supplies for the telephone and electric light trade.

MONARCH TWO-POSITION TOLL BOARD.

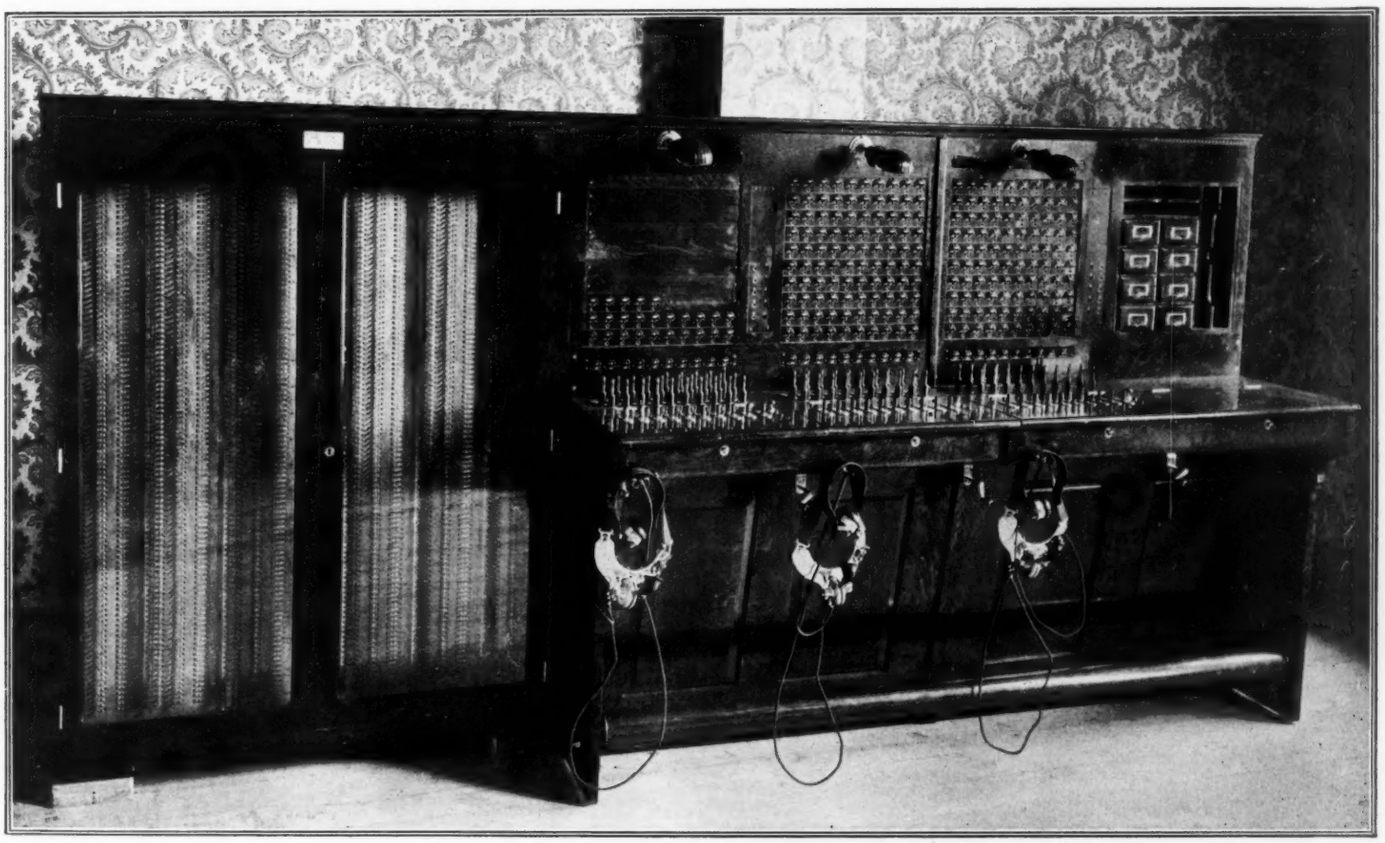
THE Standard Telephone Company of Decorah, Iowa, has just installed a two-position toll board which was built for it by the Monarch Telephone Manufacturing Company of Chicago. This toll board is to be used in connection with the 1,600-line magneto multiple board built by the Monarch company which is already in the Decorah exchange.

The new board has forty lines installed which are handled by a system of transfers to the local board, the orders being given to the local operators over order wires. The board is equipped with the bridged and series clear out system which the Monarch company has perfected. With this system it is impossible for a ring off signal to pass the switchboard, the ringing current being forced to pass through the clear-out drop which is therefore sure to operate. There are keys for ringing and listening, ringing back, listening on either cord, cutting in repeating coils, etc. A

visual signal is installed at each position used as a tell-tale to enable the operator to know if her ring is reaching the subscriber. The two positions of this toll board can be thrown into one and special switches are provided to switch all the lines over the local board for night service. This is one of the finest and most complete boards, it is said, of this type that has ever been built.

CONTINUED PROSPERITY.

THE accompanying illustration shows central office equipment furnished by the Swedish-American Telephone Company to the Stark County Telephone Company, of Toulon, Ill., a similar equipment being furnished at the same time for the exchange at Wyoming, Ill., also owned and operated by the Stark county company. These boards are of the transfer type, 300-line capacity, with 300-line lightning arrester and cross connecting equipment. Mr. Price, president of the Stark county company, states that the boards are working nicely and that the company is well pleased.



New Swedish-American switchboard of the Stark County Telephone Company, Toulon, Ill.

The Swedish-American company reports an active demand for its product, its switchboard department working overtime to fill orders promptly.

Among others that have recently placed their orders with the Swedish-American company for central office equipment are the following: Myres Telephone Company, Madison, Ind.; McQuoid Telephone Company, Memphis, Mo.; New Knoxville Telephone Company, New Knoxville, Ohio; McFall Telephone Company, Flowersville, Tenn; Forman Brothers Electric Company, Paducah, Ky.; Enterprise Telephone Company, Kerwin, Kans.; Snowflake Telephone Company, Snowflake, Ariz.; Schultztown Telephone Company, Schultztown, Ky.; Majenica Telephone Company, Majenica, Ind.; Erie Telephone Company, Limited, Jarvis, Ontario, Canada; Green Telephone Company, Waynoka, Okla.; Leighton Telephone Company, Moline, Mich.; Ponca Telephone Company, Ponca, Neb.

MASSACHUSETTS NO. 45 CABLE WAX.

THE Massachusetts Chemical Company, of Walpole, Massachusetts, manufacturers of insulating materials and compounds, has in the past sold large quantities of its No. 45 cable wax to various telephone companies for use around potheads and for general underground work where an efficient material was needed. Its No. 45 cable wax has for its base black parrafin. This material by a secret process has its melting point raised to a degree at which all temperatures met with, in electrical work, where cable wax is needed, will not soften it, and at the same time it will not crumble when exposed to cold. It has met ready adoption, it is said, by telephone and telegraph companies, and is also sold for many other purposes.

The Chicago office of the Massachusetts Chemical Company is located in the Monadnock building, and is in charge of Mr. Arthur Duclos, who is well known to the electric trade in the middle West.

TORNQUIST'S "KING OF PROTECTORS."

THE Tornquist Electrical Manufacturing Company, of Moline, Ill., has ready for distribution some printed matter descriptive of its new "King of Protectors No. 45." Its new knife switches are claimed to be a sure protection against lightning for telephones and private telephone lines and are guaranteed in every respect. The new "King of Protectors" is a model of simplicity, and is so arranged as to entirely disconnect the line from the instrument, save the telephone and the fuse, and at the same time not interfere with the working of any other instrument on the same line. On the approach of a thunder storm the switch lever is thrown open, which entirely disconnects the line from the

instrument. When the switch lever is thus operated injury to the instrument is said to be absolutely impossible. The company will be glad to furnish the printed matter to all interested parties.

TELEPHONE SYSTEM OF THE HOTEL PATTON, CHATTANOOGA.

THE new million dollar fireproof Hotel Patton at Chattanooga, Tenn., recently completed, was equipped with a

Hotel Patton central-energy switchboard

complete telephone system, instruments in each room and full central energy switchboard equipment in the office,

Hotel Patton switchboard, keyshelf raised.

manufactured by the Central Telephone and Electric Company in the plant at St. Louis, Missouri.

This board is of 300 lines capacity with 270 lines installed. The cabinet was designed to meet the requirements of the architect as to dimensions, finish, etc. The line lamps and jacks are mounted so as to conform with the room numbers of the hotel, each row of jacks being for a separate floor and each room number being in line, vertically, with the corresponding room numbers on the other floors. The key shelf is equipped with 28 operators' keys, with cams for ringing on both the answering and calling cords. The set is arranged as one position, but provision is made for two operators if necessary, by a switching key. This key with the night alarm key and hand generator keys is mounted on the plug shelf so as to be out of the way of being moved accidentally. The cord circuits have double lamp supervisory signals with two pilots. The line lamps have one pilot. The trunks to the city exchange terminate in this board in ring down drops, and in the city exchange

Back view of switchboard with panels removed.

on the regular subscribers' circuit, and it is only necessary to insert a plug in a trunk jack to call the main office. The switchboard is self-contained, every part being in the same cabinet. All of the apparatus is mounted on an iron frame, the cabinet being separate and serving as a covering only.

The Central Telephone & Electric Company will be pleased to figure upon complete hotel equipments, either taking the contract for the complete installation, or furnishing the switchboard, telephones and power equipment only.

THE BAIRD CHRONOGRAPH.

A NEW time stamp known as the "Chronograph," as in Figure 1, has just been placed on the market by the Baird Manufacturing Company, Chicago, manufacturers of pay stations and secret service telephone apparatus. It is an automatic calculating time stamp and has a number of new and valuable features which, it is said, will commend themselves to telephone managers as follows. Rapid Action: Two quick motions of the levers complete an imprint. This feature is a great time saver. One Elapsed Time Dial: Computes the time which can be noted at a glance. This arrangement relieves the operator of mentally computing the sum of two dials and writing it on the ticket. Operators Number Printed: Each operator sets this de-

vice when she takes her position and is relieved of writing her number on the ticket as in Figure 2. Small Size: The case will drop into a hole in switchboard 6 inches wide by 6 feet 2 inches from front to back. Low Levers: They rise but 4 inches above the top plate. Automatic Ribbon: The printing ribbon moves at each motion of the start lever. The mechanical action is very simple and positive. Attractive Price: Owing to the simplicity of its construction the

Figure 1.

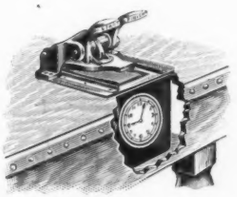


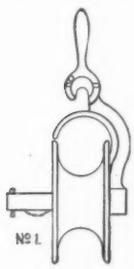
Figure 2.

Chronograph will be sold at a price it is said which is an innovation in this type of apparatus.

The Baird Manufacturing Company will gladly submit sample machines for examination and trial, as it can demonstrate its own merits to better advantage than can be described.

PULLING UP AERIAL CABLES.

VINCENT E. FURNAS, who is a recognized authority on cable trouble, has a number of very interesting photographs of damaged cable sheaths, and he states that one of the most frequent causes of injured cables is carelessness



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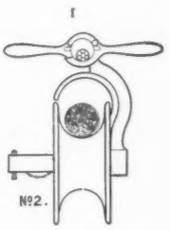

Figure 2.

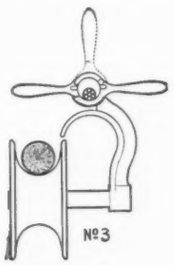

Figure 3.

in putting them up on the messenger. One of his photographs shows a crack in the armor which he says was probably caused by improper handling of the cable while it was

Figure 4.

being put up. He further states, "The greatest care should be taken in handling lead covered cables so as not to kink or twist or injure them in any way. In putting up cable the men should always place reels so that it will be necessary to bend the cable as little as possible."

William Callahan, now connected with the construction department of the Puget Sound Telephone Construction Company, of Tacoma, Washington, has had a great many years' experience in the handling of cable and cable crews and has given a great deal of study to the prevention of just such troubles as those pointed out by Mr. Furnas. He decided that the use of cable rollers was a step in the right direction. This was three years ago, when he was cable

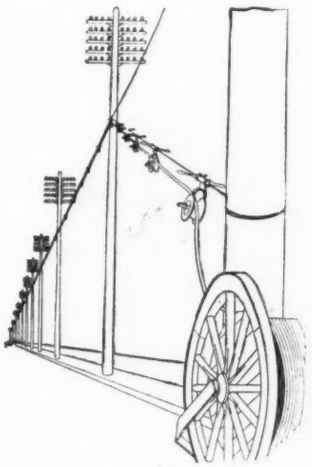

Figure 5.

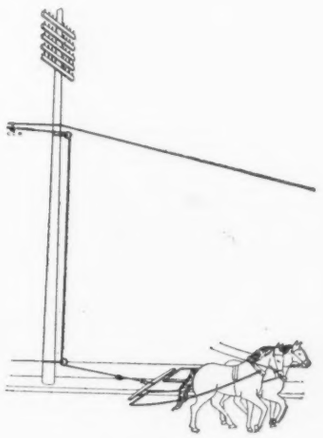

Figure 6.

foreman for the Central Union Telephone Company in Indiana. At that time he decided to get up a roller that would protect the cable; that would not damage the messenger; that could be put on and taken off instantly without tools or cumbersome contrivances liable to get out of order; and that would be practically indestructible. Such is the Callahan cable roller.

Fig. 1 shows an outline drawing of this roller ready to be dropped over and clamped to the messenger. Fig. 2 shows how it is clamped to the wire by pulling down the eccentric handles in opposite directions, and the cable passing through

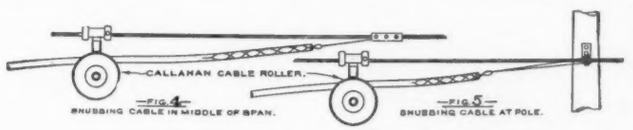

Figure 7.

the roller. Fig. 3 shows the way the roller can be moved out on the shaft in order that the cable may be removed after it has been pulled up. By raising the eccentric handles up, as shown by the dotted outline, the roller is released from the messenger and may be lifted off instantly. Fig. 4 shows the Callahan Cable Roller in detail. It will be seen that it is strongly built, and there are no sharp corners or edges that could damage the cable. Everything is rounded off and smooth. The roller is made entirely of malleable iron, which makes it practically impossible to break it. A set of these rollers should last a life time with reasonable care. They weigh ten pounds each.

Figures 5, 6 and 7 show the method of using Callahan cable rollers and the ease with which long lengths of cable can be put up.

The larger Bell and Independent companies use many of these at a time spacing them fifteen to twenty feet apart on the messenger. The smaller companies, who only have occasion to use these rollers once in a long time, usually combine with two or three other companies in the joint ownership of a set and in this way they all have the advantage of using them without the necessity of standing the full cost of a set.

The great saving of time that can be effected by the use of these rollers can be appreciated when it is learned that a

set of fifty can be placed on the messenger in a half hour and that a crew can pull up as much as 12,000 feet of cable in a day.

STERLING'S NEW DESK STAND.

THE Sterling Electric Company, La Fayette, Indiana, is meeting with continued success with its new desk stand No. 322. This stand is made up of a heavy pressed steel base, the upright being of pressed steel, cut out so that when the rubber shell or covering is removed all of the hook springs can be inspected. The base contains the induction coil, which can be withdrawn by simply removing the dust plate from the bottom of the stand and loosening up one screw as shown in Figure 1.

Figure 1.

Figure 2.

Figure 3.

The induction coil has four springs, which, when placed in the stand, are inserted in the hook springs, acting the same as the contacts on a knife switch. The transmitter is removed in the same way, by removing one screw and withdrawing as in Figure 2. The desk stand, as illustrated in Figure 3, is complete, with the rubber shell removed, ready for inspection. The rubber shell is made especially for this stand, being molded over a brass tubing so that it is impossible to break it. These stands are made in either white or black nickel.

TRADE NOTES.

THE FORT WAYNE ELECTRIC WORKS, New York office formerly located at 40 New street, has been moved to the Cortlandt Building, Hudson Terminal.

THE ILLINOIS ELECTRIC COMPANY, Chicago, has prepared a special catalogue number for the construction period which will be mailed to all interested parties.

BAKER & COMPANY announces the removal of its New York office to the Cortlandt Building, Hudson Terminal. It has excellent facilities in its new quarters and is prepared to give its friends careful and prompt attention.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, New York, is issuing to the trade its pamphlet No. 7 advocating the use of "Sure Ring" condensers in magneto telephones, which will be sent to all interested parties.

THE C. A. MANUFACTURING COMPANY, Austin, Texas, is sending out interesting literature in the form of an article on timber preservation by Dr. E. P. Schock, professor of chemistry at the State University of Texas, which was read at the convention of the Southwestern Electrical and Gas Association, El Paso, Texas. The company will be pleased to send a copy of this paper to anyone desiring it.

THE CLAY PRODUCT COMPANY has moved its Chicago office to the Stock Exchange Building, where it has more comfortable and commodious quarters. It reports that it has been very successful in this year's business, having contracted with the Chicago City Railway Company and the Chicago Railways Company for all of the single duct conduit which they are using in the work of rehabilitating the Chicago street car lines. This, it is said, speaks well for the quality of its products.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, Buffalo, New York, announces constantly increasing business and some of its recent contracts now under construction are as follows: Naples, New York, 1 150-capacity, magneto switchboard, with 125 telephones, and complete equipment of protective apparatus, both for inside and cable plant. Panama, Nebraska, 1 150-capacity, magneto switchboard, with inside protection and arrester cabinet, and 150 telephones. Avoca, New York, 1 100-capacity, magneto switchboard. Adams Basin, New York, 1 100-capacity, magneto switchboard with complete inside protection, and 160 telephones. Spencerport, New York, 1 2-position, 200-capacity, magneto switchboard, with inside protection, and 235 telephones. Wellsville, New York, 1 6-position, common battery, multiple, lamp signal switchboard.

TELEPHONES IN OKLAHOMA.

THE annual statements of the taxable property of 256 telephone companies in Oklahoma, which are now on file in the office of State Auditor M. E. Trapp, show a total valuation of $190,378.50 as placed by the officers of the companies.

The mileage of these companies amounts to 10,164.06 miles. The gross receipts for the year ending January 1, 1908, from whatever source derived in the state of 82 of the 256 companies reporting, amounts to $81,606.37. A large number of the companies are mutual and rural corporations, operating only for the convenience of the subscribers and deriving no revenue.

It is estimated that fully 200 telephone companies had not reported the amount of their taxable property at that time.

"THE INTEGRITY OF THE INDEPENDENT TELEPHONE SYSTEM AND ITS UNIVERSAL EXTENSION"

Telephony.

AN ILLUSTRATED MONTHLY TELEPHONE JOURNAL

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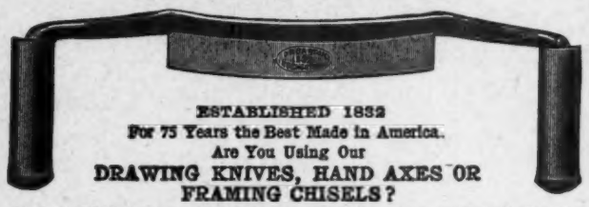

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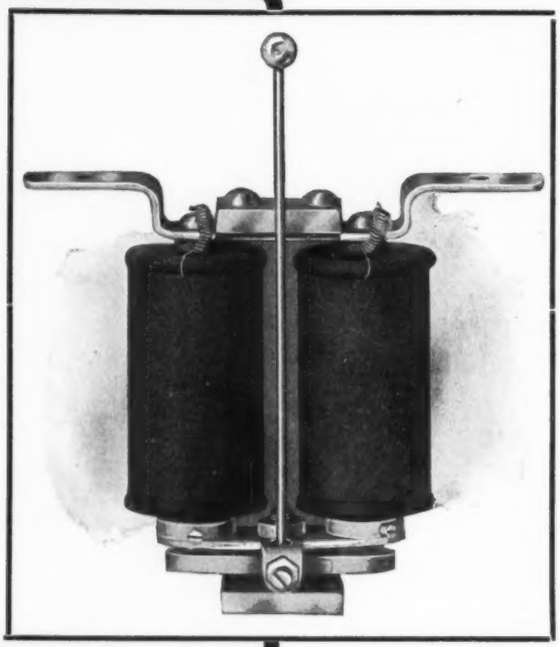

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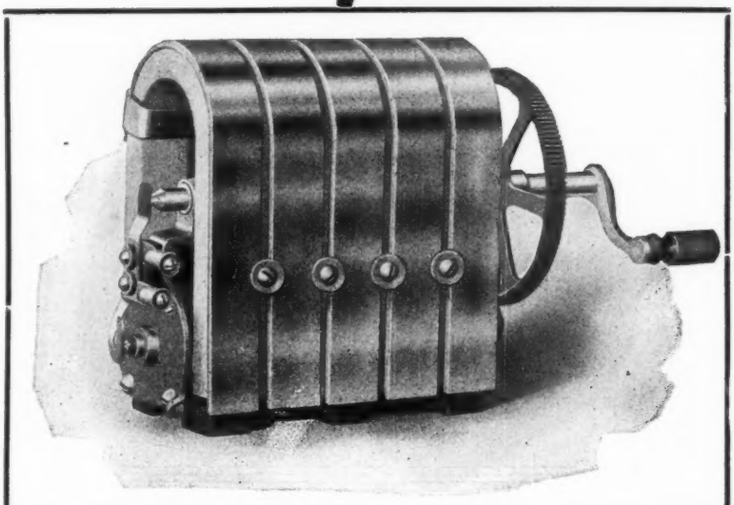

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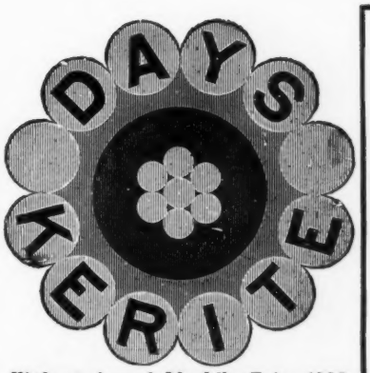

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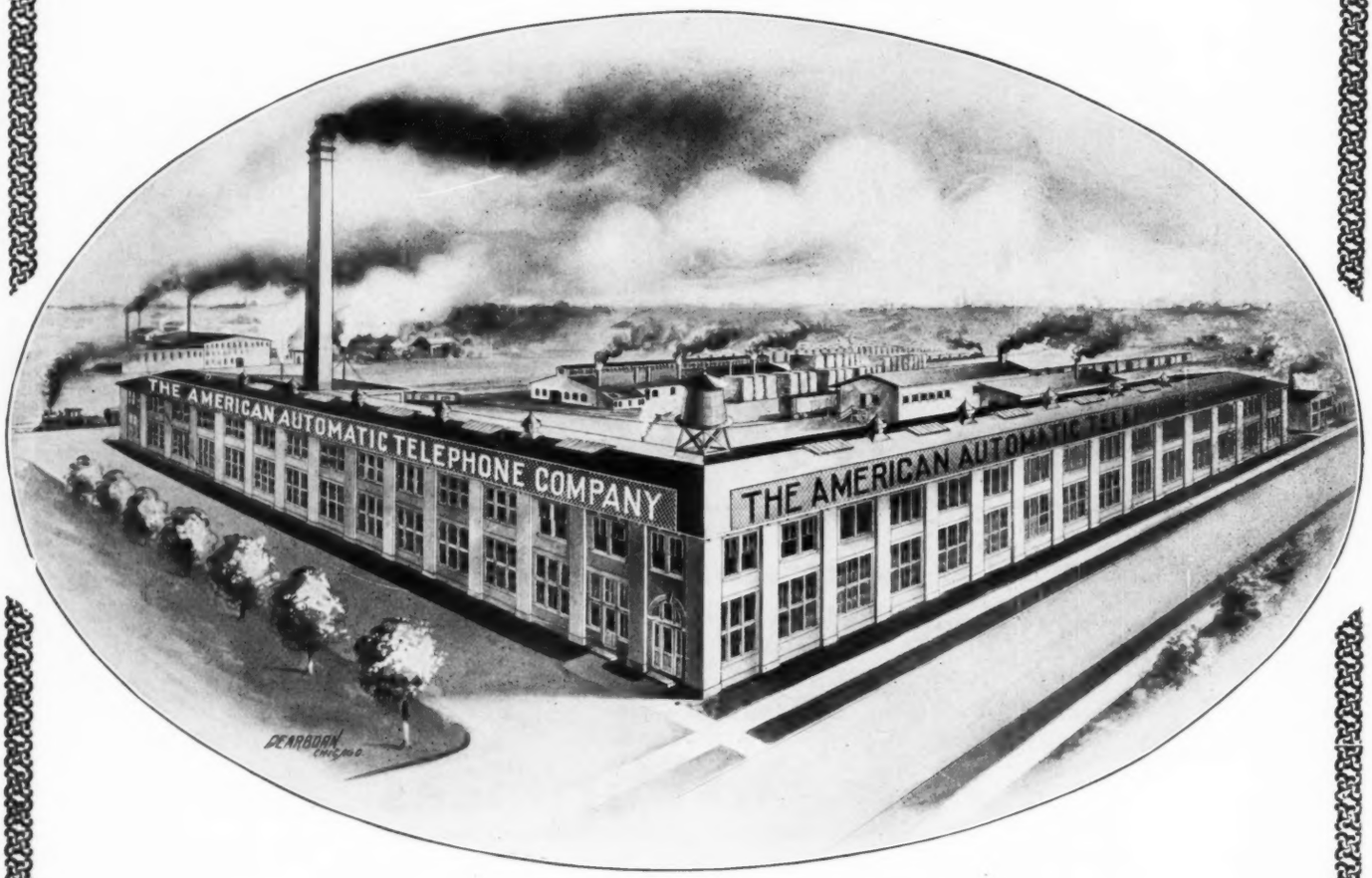

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Code No. 358 Telephone

¶ The switch hook, ringer and adjustable transmitter arm were purposely designed for this telephone to effect the most accessible assembly in a metal case requiring a maximum wall space of only $6\frac{3}{4}$x$5\frac{13}{16}$ inches.

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¶ Some of the most recent hotel installations using No. 358 Telephone in connection with our switchboard equipment are:—the Statler Hotel, Buffalo, New York; the Secor Hotel, Toledo, Ohio; the new Rochester Hotel, Rochester, New York.

¶ Send us a sample order—you will discriminate hereafter.

Bulletin No 15 and Prices Upon Application.

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Rochester, New York **Chicago, Illinois**

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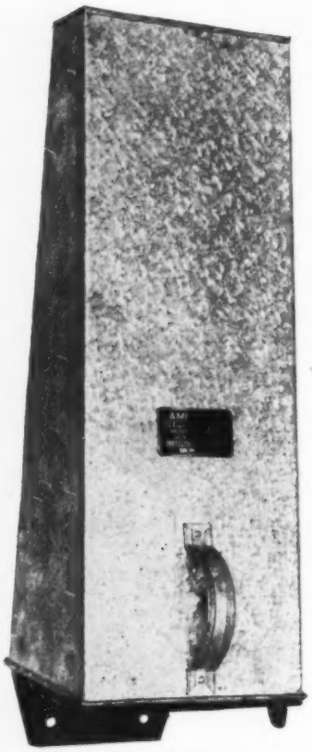

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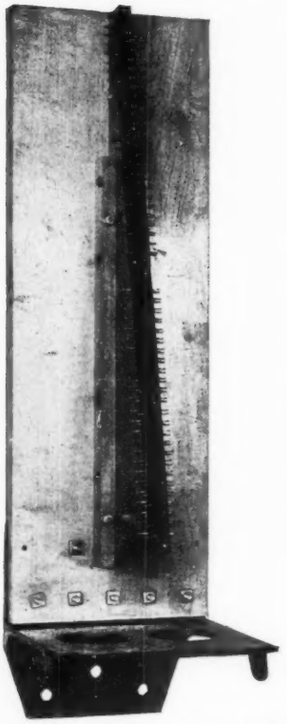
For heat coils or for mica fuses and carbon lightning arresters. Finely finished golden oak.



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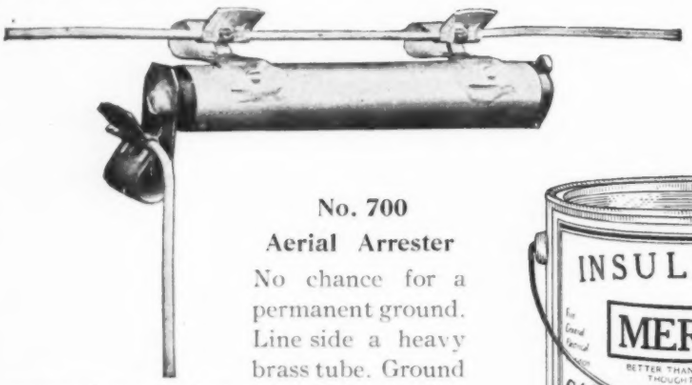

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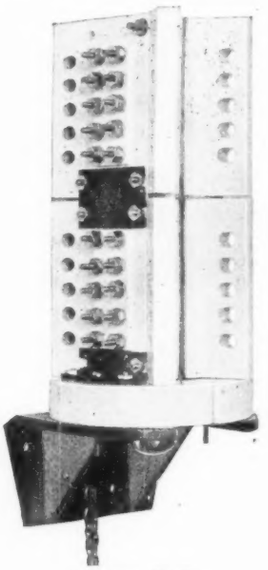

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All Porcelain

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A-5360 Unit Type Cabinet with Foot Rail.

No. 8 SELF-RESTORING GRAVITY DROP

¶ Appropriate for present and future—economical and efficient **Magneto Service.** A compactly constructed cabinet of the **Unit Type** adaptable for installation where rapid or slow growth of exchange equipment is desirable.

¶ Combined in a simply designed and massively constructed cabinet of well seasoned, kiln-dried lumber of our own selection and our latest **No. 8 Self-Restoring Gravity Drop Line Equipments** and necessary accessories, which assemble the most practicable **Magneto Switchboard** obtainable to-day.

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¶ You run no risk of getting flimsily built switchboard cabinets when you buy the "Stromberg-Carlson"—the only switchboard cabinets that wear as well as they look.

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¶ You avoid this trouble by getting "Stromberg-Carlson" Switchboard Cabinets.

¶ Notably attractive is the finish on "Stromberg-Carlson" cabinets—principally economical are strength and durability in "Stromberg-Carlson" cabinets.

A-5360. 150-Line Switchboard Cabinet

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¶ Besides exerting unusual effort to produce a "drop" that is a perfect mechanism of well-designed parts—we provide maintenance economy.

¶ Every "Stromberg-Carlson" feature in the design of our apparatus that eliminates your attendance means just that much **less** cost added to the maintenance of your telephone equipment.

¶ **No. 8 Self-Restoring Gravity Drops** do not require adjusting and are reliable under all conditions.

¶ **Quality Apparatus** is the fundamental foundation of economical and efficient service—it will pay you always to consider **Quality First!**

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That the same amount of money oftentimes spent for a switchboard of inferior quality and design—will buy the economical and efficient Stromberg-Carlson **Magneto Switchboard**—thereby effecting the **economy** expected later and providing **efficient** service you require to **increase the earning power of your original investment.** It will pay you well to take a keen interest in all the lasting and economical features of **Quality Apparatus**—especially in this form of **150 Line Magneto Switchboard.**

Send for Latest Prices and Pamphlet No. 6.

We are furnishing a foot rail at no additional cost to you.

STROMBERG-CARLSON TEL. MFG. CO.

ROCHESTER, N.Y.-CHICAGO, ILL.

Gray Telephone Pay Stations

And Registers Now Carried in

CHICAGO STOCK

No. 10

The simplicity of construction of Gray Pay Stations makes them particularly desirable.

There are no levers or springs to break, stick or slow down the service. They are practically everlasting and at no maintenance expense.

They are always appreciated by the user who is required to do nothing but deposit the coin, and they allow for the most rapid service.

Your orders for any of the standard styles of Gray Pay Stations can be filled from our Chicago stock the day they are received, and at a saving in freight charges, especially if ordered with other supplies.

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No. 13-A

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239-241 MADISON STREET CHICAGO, ILL.

Standard Telephone Construction Material, Tools, Specialties, Etc.

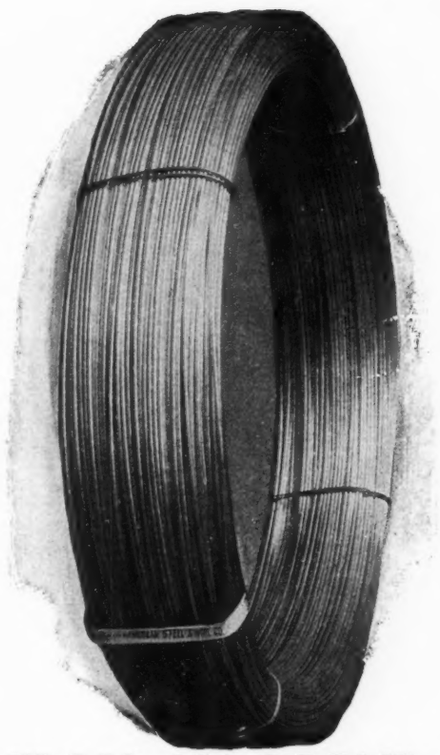
American Steel & Wire Co.

Chicago New York Worcester Denver San Francisco

Maker of

W. & M.

Telephone Wire



½ Mile Coil No. 8 Galv. B. B. Tel. Wire.

OUR W. & M. Telephone Wire is drawn from either steel or iron stock made especially for the purpose and rigidly inspected. The spelter is carefully laid on with uniform thickness. Lately improved processes of galvanizing are employed, ensuring ample protection and long life for the wire under extreme weather conditions.

In point of conductivity, this good wire has attained the highest possibilities of electrical science, and we submit our three brands, "E.B.B.", "B.B." and "Steel" as the best that can be produced.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

1908 MODEL
PRESSED STEEL TELEPHONE
Indestructible

No. 48

Gongs are mounted on gong stands which are adjustable by means of micrometer screws, accessible from the outside of the box.

Each operative part is self-contained and separately accessible.

This Telephone is made of pressed **Steel** of sufficient thickness so that it is **rigid.** This is a rare quality in telephones built along these lines.

It is as strong as a cast iron box.

Rough handling does not disturb its alignment.

Hinged in two places.

—

Remove any part without removing any other part.

Condenser is removable without taking the telephone from the wall.

—

One screw holds all parts securely together.

—

Lugs are provided in the cast base of sufficient area so that the telephone, when mounted, will not mar the plaster.

Removable lever switch-hook.

—

Adjustable transmitter.

—

Flexible cord connects all operative parts.

American Electric Telephone Company

MANUFACTURERS

Central Energy and Magneto Telephones and Switchboards of Highest Grade.

STATE AND 64TH STREETS, CHICAGO, ILL., U. S. A.

Englewood Station

An Unusual Investment Opportunity

A SYSTEM OF RAPID AUTOMATIC TELEGRAPHY THAT TRANSMITS MESSAGES AT THE RATE OF 50 WORDS FOR 25 CENTS, ANYWHERE IN THE UNITED STATES.

The TELEPOST

AN INDEPENDENT TELEGRAPH CORPORATION, TO BE OPERATED IN CONJUNCTION WITH THE INDEPENDENT TELEPHONE COMPANIES OF AMERICA, WITH SIMULTANEOUS USE OF WIRES.

Capital Stock, $18,000,000

VOTING TRUSTEES

HON. JOHN W. GOFF, New York, Judge of the Supreme Court.
S. S. M'CLURE, New York, Editor and Founder of McClure's Magazine.
H. D. CRITCHFIELD, Milwaukee, Wis., President Milwaukee Independent Telephone Co.
F. W. SHUMAKER, New York, Treasurer Sterling Debenture Corporation.
H. LEE SELLERS, New York, Secretary R. H. Sellers Company.

DIRECTORS

CAPT. W. J. BARNETTE, U. S. N., Washington, D. C.
General Board, Navy Department.

A. K. BROWN, Chicago, Ill.
President Kenwood Trust and Savings Bank, Chicago.

JOHN M. CARRERE, New York,
Carrere & Hastings, Architects.

THOMAS CONYNGTON, New York,
Conyngton & Harrison, Attorneys.

H. D. CRITCHFIELD, Milwaukee, Wis.
President Milwaukee Independent Telephone Company.

HON. WILSON H. FAIRBANK, Warren, Mass.
Ex-State Senator, Massachusetts.

R. H. SELLERS, New York,
Secretary and Treasurer.

H. LEE SELLERS, New York,
President.

C. H. SILLIMAN, New York.
Banker.

The Telepost Company owns all the rights and patents of the Delany System of Rapid Automatic Telegraphy. After a successful, practical demonstration over a broad circuit in actual work, covering a long period, this system is now commercially perfected.

The Telepost Company is now preparing to construct its Boston-San Francisco Trunk Line. Financial arrangements are in the hands of the Sterling Debenture Corporation of New York, who are authorized to receive advance subscriptions, in small blocks only, from the Independent Telephone operators of the country.

Independent Telegraphy is the natural ally of Independent Telephony. Co-operation will assure rapid installation in all sections of the country.

The profits that will come to the original shareholders of the Telepost may be judged from the fact that, even with its greatly reduced rates, the new company will make a net profit per message three times as great as the old-time systems can make with their high rates. And this enormous profit will be distributed over an $18,000,000 capitalization, as against the $218,000,000 capitalization of the old systems.

With the unusual protection afforded to the small shareholders through the provisions of the Board of Voting Trustees, an investment in Telepost stock is as safe as a government bond, and the opportunity for subscribing is not likely to remain open long.

Write for Booklet No. 75, which contains a full prospectus for investors.

Sterling Debenture Corporation

Brunswick Building, Madison Square, NEW YORK

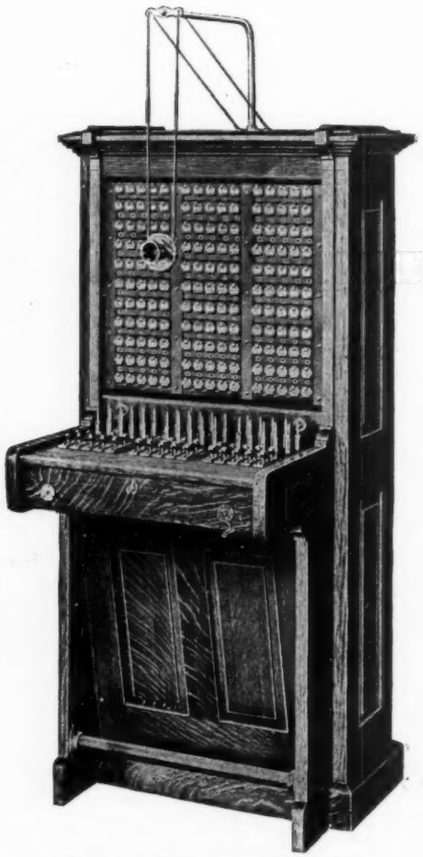
200 Line Lamp Signal Switchboard with 20 Trunk Lines. One of our Recent Common Battery Private Exchange Equipments.

Private Branch

Exchange Equipments will increase earnings and build up your list of subscribers. We make a specialty of this class of work and can meet the requirements of any system, either common battery or magneto call. . . .

Common Battery and Magneto Signaling

Exchange Systems of any capacity right up-to-date in every detail. . . . .



150 Line Magneto Signaling, Self-Restoring Drop Switchboard with 15 Cord Circuits.

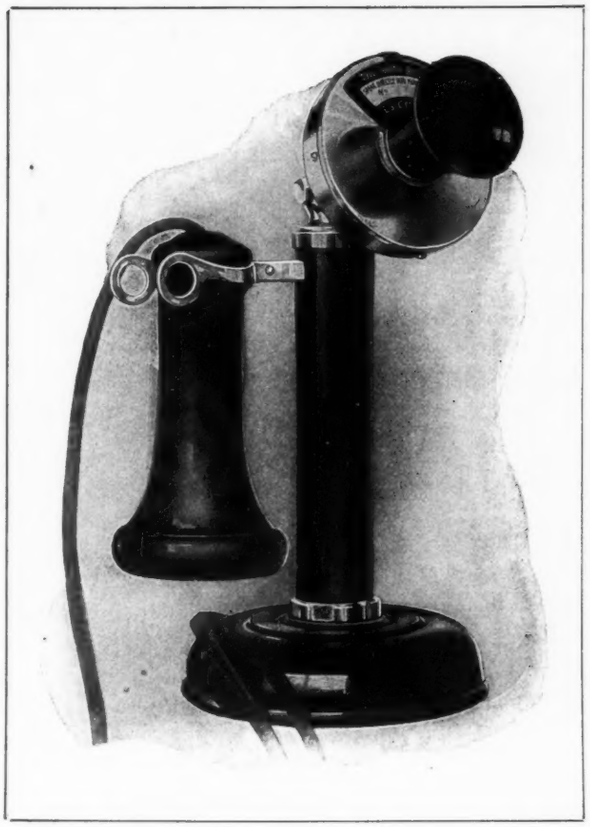
CENTURY TELEPHONE CONSTRUCTION CO.

BUFFALO, N. Y.

Western Branch
Kansas City, Mo.

Canadian Branch
Bridgeburg, Ont.

Please tell the Advertiser you saw his Announcement in TELEPHONY.



Direct Current Common Battery Desk Sets

¶ No matter what way one looks at them, D. C. Common Battery Desk Sets impress one by their sightliness and mechanical correctness of design. Base is of stamped steel. The strong combined head and knuckle insure against breakage.

¶ Portable carries all talking parts. Switch hook has but one contact. The two-conductor cord which runs to signal box, cannot be connected up wrong, for it works either way. All possibility of connecting the D. C. Desk Set up wrong is obviated.

¶ All parts which require inspection are placed in the base of the portable, access to which is obtained by the removal of one nut in the bottom of the base.

¶ The DIRECT CURRENT phone requires neither impedance coil nor induction coil. The auxiliary coils in the receiver prevent demagnetization of receiver and buckling diaphragm. Talking circuit consists merely of transmitter and receiver in series. The D. C. Desk Set combines strength of construction with simplicity of circuits.

¶ Write for booklet describing D. C. Receiver and Telephone in detail. We will send, express prepaid, sample D. C. Desk or Wall Set.

The Vote-Berger Company

Makers of Highest Grade

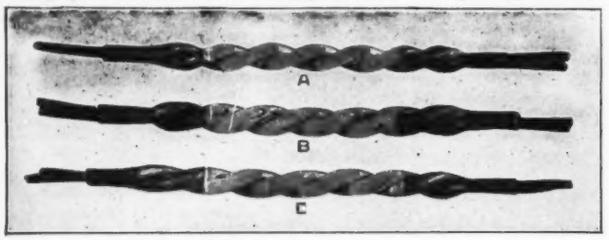
Telephones and Switchboards

La Crosse, Wisconsin

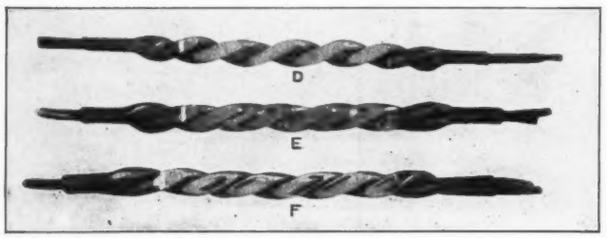
Here's the whole story

These cuts are from photographs that have NOT been retouched.

(Photographs show joints after twisting filed half through longitudinally.)



A—COOK NUMBER 10 JOINT WITH NO. 10 WIRE
B—COMPETITOR 1—NO. 10 JOINT WITH NO. 10 WIRE
C—COMPETITOR 2—NO. 10 JOINT WITH NO. 10 WIRE



D—COOK NUMBER 10 SLEEVE WITH 10 AND 12 WIRE
E—COMPETITOR 1—NO 10 SLEEVE WITH 10 AND 12 WIRE
F—COMPETITOR 2—NO 10 SLEEVE WITH 10 AND 12 WIRE

It's the flat side that does it.

There's no mistaking the moral to this story. The only way to secure such an absolute union between sleeve and wire is to use the

COOK SELF WELDING WIRE JOINT

No other joint draws up to the wire and stretches tight around it. Other joints when twisted leave air spaces that lead to corrosion and consequent deterioration.

For permanently perfect joints, specify Cook's.

Frank B. Cook.

242 West Lake Street
CHICAGO, ILL.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

ARE YOU BUYING TELEPHONES

HAVE YOU TRIED THE STERLING

TELEPHONES OF QUALITY

TRANSMITTERS FOR LONG DISTANCE SERVICE

YOU TAKE NO CHANCES

ALL GOODS GUARANTEED

No. 18C
5 Bar Generator. 1600 Ohm Ringer

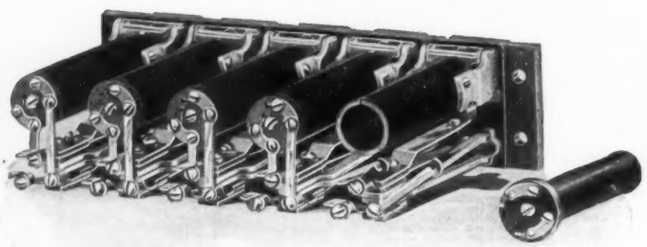
Write For Prices

STERLING ELECTRIC CO.

GOOD GOODS

LA FAYETTE, IND.

MONARCH

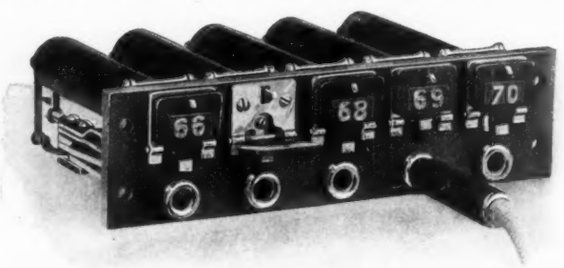


The Monarch Line Drop

The armature of our line drop is mounted on the front of the coil shell and pivoted in such a way the shutter hook is given a downward throw.

The shutter hook is short, rigid and light, permitting the armature to be held in such perfect balance as to make the drop extremely sensitive and its operation exceptionally positive and reliable.

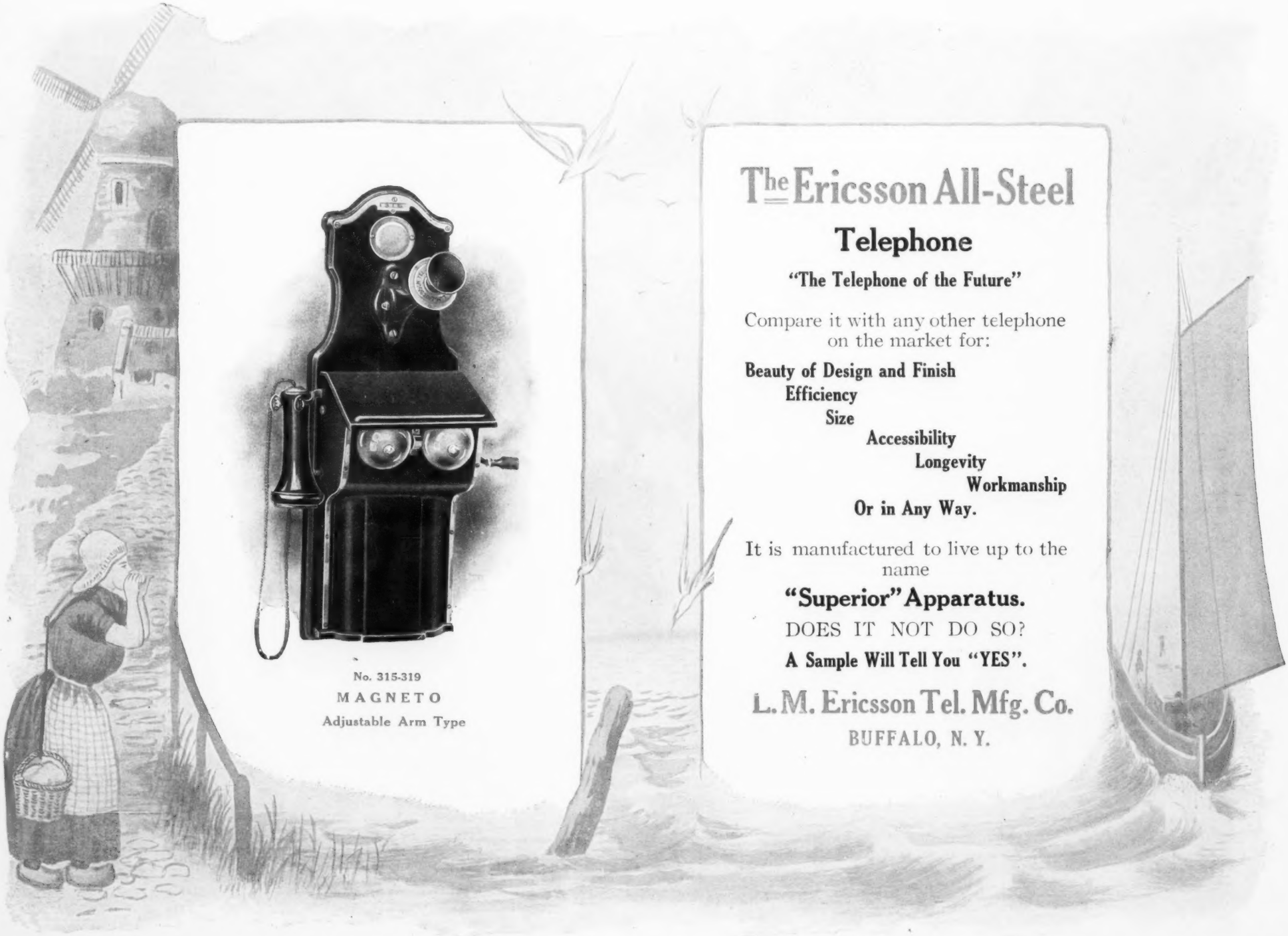
The coil can be removed by loosening the screws on the coil head engaging the connecting clips, which can then be pushed to the side and the coil slipped out. The coil is therefore removed without breaking a single soldered connection or without so much as disturbing the adjustment of the armature. These features of perfect mechanical construction and accessibility are characteristic of every piece of apparatus we manufacture.



Let Us Send You a Catalogue

Monarch Telephone Mfg. Co.
CHICAGO, U.S.A.

Please tell the Advertiser you saw his Announcement in TELEPHONY.



No. 315-319
MAGNETO
Adjustable Arm Type

The Ericsson All-Steel
Telephone

"The Telephone of the Future"

Compare it with any other telephone on the market for:

Beauty of Design and Finish
Efficiency
Size
Accessibility
Longevity
Workmanship
Or in Any Way.

It is manufactured to live up to the name

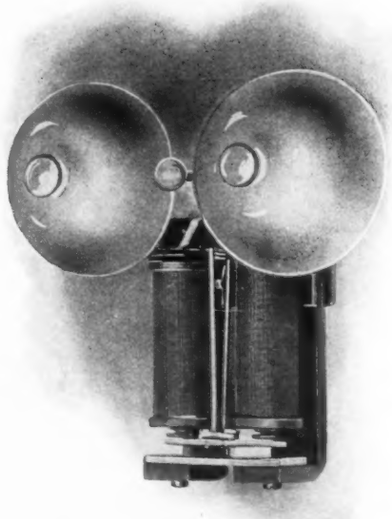
"Superior" Apparatus.

DOES IT NOT DO SO?

A Sample Will Tell You "YES".

L. M. Ericsson Tel. Mfg. Co.
BUFFALO, N. Y.

NO MICROMETER ADJUSTMENT



THE ERICSSON
'B' TYPE "SUCCESS" HARMONIC RINGER

The HARMONIC RINGER is the most practical Party Line Signal.

The Party Line increases earnings, lessens investment and affords a Telephone of low rental and large earning capacity.

ALONG with the Party Line and Harmonic Ringer have heretofore come disagreeable features:

Cross Ringing
Armature Hum
Micrometer Adjustments

and many bad feelings as a result of unsuccessful Ringers.

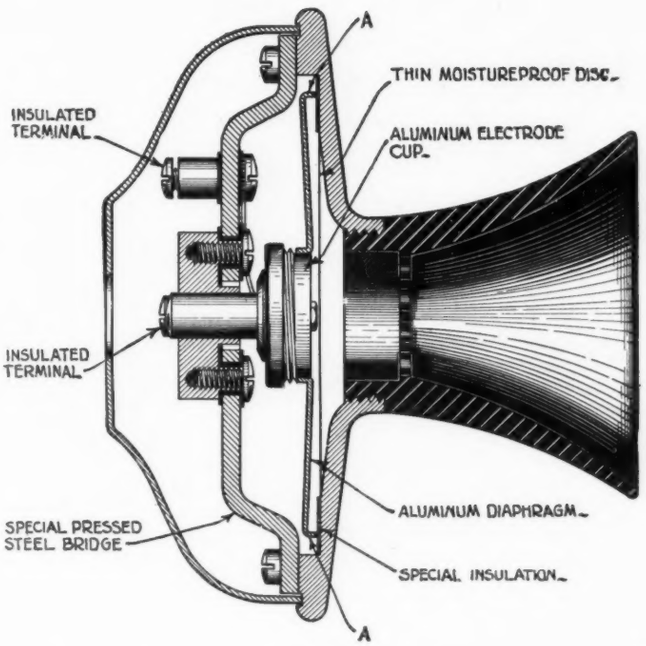
The trouble with the Ringers has been in the Armature Support. The stiff spring or reed necessitates a heavy clapper. This in turn causes a sluggish action of the Ringer and non-response to the proper frequency.

The "Success" Harmonic has the Armature supported freely in front of the pole pieces—it allows the use of light clappers resulting in a loud clear ring and instantaneous response to the proper frequency.

Write for Bulletin No. 10 and Prices

L. M. Ericsson Tel. Mfg. Co.

BUFFALO, N. Y.



An Indestructible Transmitter

¶ One of the greatest difficulties in transmitter construction has been the apparent necessity of using some parts that are affected by hot or moist atmospheres. ¶ To eliminate these sources of trouble The Dean Electric Company has perfected an improved transmitter that contains no parts that can possibly deteriorate in any climate.

¶ NO RUBBER GASKET is required as the edge of the diaphragm is curled (indicated by A in the diagram above) and properly insulated by a strip of oiled muslin. ¶ This also holds in place a thin moisture proof disc that protects the mechanism from any moisture that might enter through the mouthpiece.

¶ The CURRENT CONSUMPTION is very small—normally it is automatically reduced to two-thirds the amount required while talking. ¶ The slight cupping of the diaphragm toward the front is the secret of this action. ¶ This also absolutely prevents "packing."

¶ NEW AND ORIGINAL are these features—they are the product of "DEAN" Engineers. ¶ The new transmitter is a standard size as shown on the desk-set below. ¶ And it is guaranteed.

The DEAN Electric Company
Elyria, Ohio

BRANCH HOUSES:

KANSAS CITY **SAN FRANCISCO**

WHAT IS A GUARANTEE?

¶ The courts have held that a guarantee must specify particular qualities to be binding.

¶ Here is a real guarantee.

All Dean telephone apparatus is fully guaranteed to be free from patent infringements and from all defects in material, design, and workmanship.

2-10 of 1% per annum

of the first cost is the cost of materials (repair parts) required to maintain an Automatic switchboard.

14-100 of 1% per annum

of the first cost of automatic telephones (over and above the regular manual maintenance cost of receiver and transmitter repairs) keeps them in good condition.

That's the record

of seven of the largest Automatic exchanges in the United States, taken from a careful tabulation of all repair materials they have purchased in the past two years.

Don't you wish

your old fashioned manual apparatus was costing you no more? It never has and never can approach the low cost of automatic maintenance because it is continually subject to wear and tear from the careless handling of operators. The Automatic is continually and consistently "the economical system."

Our Automatic System is in use in the following cities:—

Aberdeen, South Dakota.
Akron, Ohio.
Allentown, Pennsylvania.
Auburn, Maine.
Auburn, New York.
Battle Creek, Michigan.
Beaver Falls, Pa.
Bellingham, Washington.
Berkeley, California.
Billings, Montana.
Butte, Montana.
Cadillac, Michigan.
Champaign, Illinois.
Chicago, Illinois.
Cleburne, Texas.
Columbus, Georgia.
Columbus, Ohio.
Dayton, Ohio.
Decatur, Illinois.
Denver, Colorado.
Dowagiac, Mich.
Edmonton, Alberta, Canada.
El Paso, Texas.
Emaus, Pa.
Fall River, Massachusetts.
Grand Rapids, Michigan.
Hastings, Nebraska.
Havana, Cuba.
Hazleton, Pennsylvania.
Holland, Michigan.
Hopkinsville, Kentucky.
Houston, Texas.
Jonesboro, Arkansas.
Kenton, Ohio.
Lake Benton, Minnesota.
Lewiston, Maine.
Lincoln, Nebraska.
Los Angeles, California.
Manchester, Iowa.
Marianao, Cuba.
Marion, Indiana.
Medford, Wisconsin.
Mount Olive, Illinois.
New Bedford, Massachusetts.
Norfolk, Nebraska.
Oakland, California.
Ocean Park, California.
Omaha, Nebraska
Pentwater, Michigan.
Pontiac, Illinois.
Portland, Maine.
Portland, Oregon.
Princeton, New Jersey.
Richmond, Indiana.
Riverside, California.
Rochester, Penna.
Rushville, Indiana.
San Diego, California.
San Francisco, California.
Santa Monica, California.
Saskatoon, Sask., Canada.
Sioux City, Iowa.
South Bend, Indiana.
Spokane, Washington.
St. Marys, Ohio.
Strathcona, Alberta, Canada.
Tacoma, Washington.
Toronto Junction, Canada
Traverse City, Michigan.
Urbana, Illinois.
Van Wert, Ohio.
Walla Walla, Washington.
Wausau, Wisconsin.
Westerly, R. I.
Wilmington, Delaware
Woodstock, N. B., Can.

AUTOMATIC ELECTRIC COMPANY

Van Buren & Morgan Streets

CHICAGO, U. S. A.

BELDEN MANUFACTURING COMPANY

Standard Telephone Cordage

Desk-Stand Cords

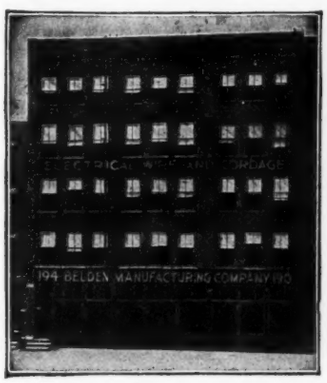
Receiver Cords

Switchboard Cords

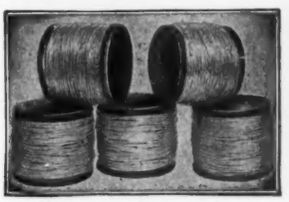
Transmitter Cords

Multiple Conductor Cordage

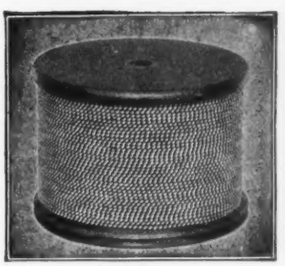
In 1902 our factory and offices occupied 3000 sq. ft. floor space. In 1907 the building shown below containing 36000 sq. ft. floor space is entirely devoted to our manufacturing and office requirements.



BELDEN FACTORY AND OFFICES
194 Michigan Street
CHICAGO



Belden Rosin Core Solder



Switchboard, Jumper Office and Annunciator Wires

SOLE PREMIER MANUFACTURERS

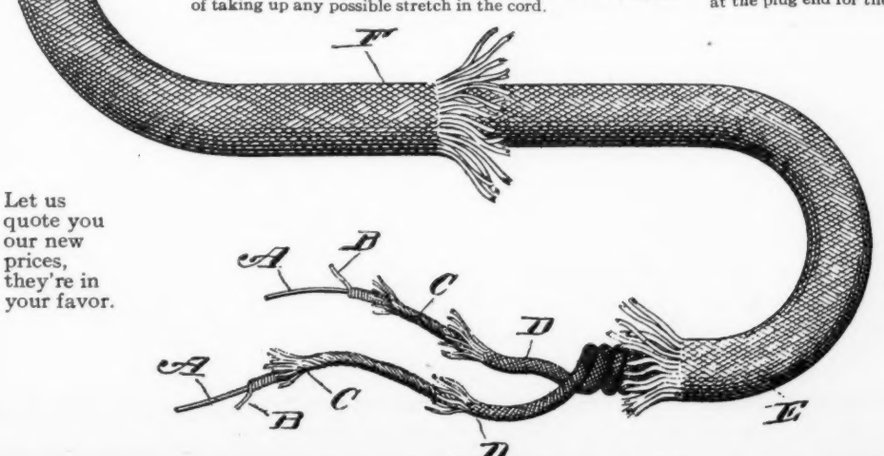
CONDUCTORS A-B are made of special prepared hard drawn steel wire, insuring flexibility and durability. Owing to the high resistance of the steel wire, a winding of copper wire is applied to reduce the resistance.

INSULATION C-D. Each conductor has a triple insulation, the first consisting of a serving of silk, the second of a serving of cotton, and the third a braiding of waxed cotton.

FORMATION. Both conductors are formed into a concentric spiral as illustrated by cut. Over the spiral is applied a braiding of cotton on the longitudinal effect for the purpose of taking up any possible stretch in the cord.

RE-ENFORCEMENT SPRING made of very high grade stee wire is inserted in the hollow of the cord at PLUG END for the purpose of doubly re-enforcing the cord at the end that is subject to the greatest usage. The spring is inserted in a manner that prevents the conductors from being thrown out of alignment, making it almost impossible to break the cord at the PLUG END—regardless of how the operator may insert or jam it into the switchboard jacks.

OVERALL BRAID E-F. Consists of special high-graded linen. Thread boiled in wax. A double braiding is applied at the plug end for the re-enforcement.



Let us quote you our new prices, they're in your favor.

Runzel-Lenz Electric Mfg. Co.
97-101 S. Clinton St.
Chicago

THE STANDARD FOR RUBBER INSULATION

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

1889 Paris Exposition Medal

OKONITE

TRADE MARK
REG. U.S. PATENT OFFICE.

1893 World's Fair Medal

OKONITE WIRES

MANSON TAPE

OKONITE TAPE

CANDEE WEATHER-PROOF WIRES

CANDEE PAT'D. POT HEADS

WILLARD L. CANDEE, H. DURANT CHEEVER, } Managers

GEO. T. MANSON, General Superintendent
W. H. HODGINS, Secretary

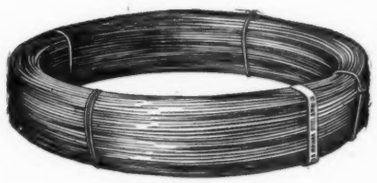
SOLE MANUFACTURERS

253 BROADWAY THE OKONITE CO., LTD. NEW YORK CITY

Telephone Wire

STEEL

THE WIRE of QUALITY



B. B.

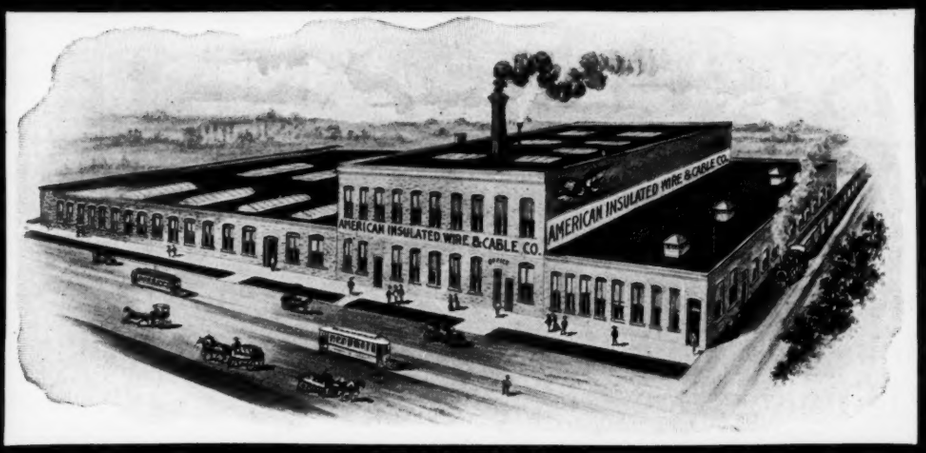
The Wire that Satisfies Under All Conditions. Sold by Leading Jobbers and Supply Houses

E. B. B.

INDIANA STEEL & WIRE CO.

MUNCIE, INDIANA

Weather-Proof Wire



Weather-Proof Cable

ESTABLISHED 1899

National Electrical Code Standard Weatherproof Wire

"AMERICAN BRAND" will improve the service and reduce cost of maintenance of electric light, power and telephone lines. Ask your jobber for "AMERICAN BRAND" WEATHERPROOF WIRE. If he cannot furnish same, we can on receipt of your order. PRICE AND SAMPLES SUBMITTED UPON REQUEST.
Telephone Wire in accordance with A. T. & T. Co's. Specifications only.

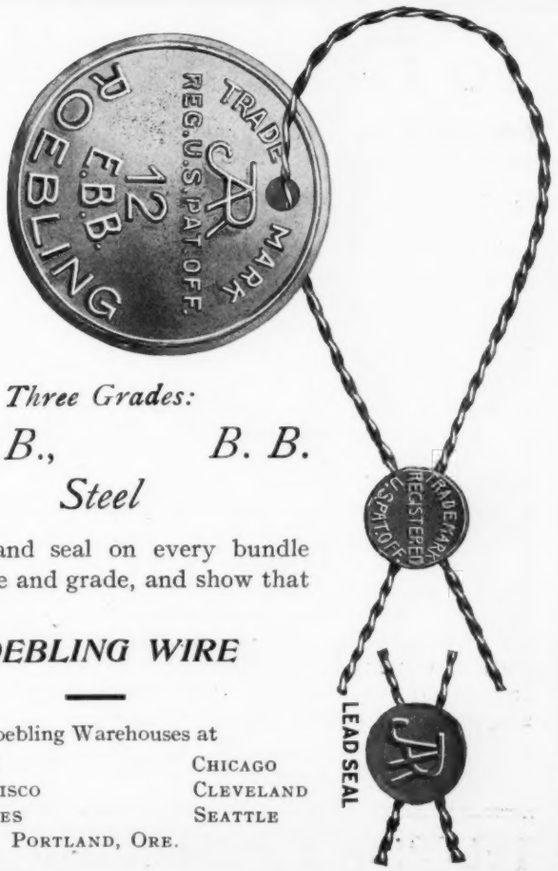
American Insulated Wire & Cable Company
CHICAGO, ILLINOIS, U. S. A.

John A. Roebling's Sons Co.

MANUFACTURERS OF

DOUBLE GALVANIZED TELEPHONE WIRE

Made at TRENTON, NEW JERSEY



Three Grades:

E. B. B., B. B. Steel

A tag and seal on every bundle denote size and grade, and show that it is

ROEBLING WIRE

Roebling Warehouses at

NEW YORK — CHICAGO
SAN FRANCISCO — CLEVELAND
LOS ANGELES — SEATTLE
PORTLAND, ORE.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

CONSTRUCTION MATERIAL

GALVANIZED Telephone and Telegraph Wires, Cross Arms and Braces, Pins, Brackets, Insulators, Pole-Steps, Lag Screws, Clips, Machine Bolts, Carriage Bolts, Shims, Messenger Clamps, Lightning Arresters, Guy Anchors, Ground Rods.

Our Stock of Construction Material and Appliances is Complete and Adequate in Every Way. Send Us Your Orders.

Specify Okonite wherever a Rubber Covered Wire is needed.

OKONITE IT NEVER DISAPPOINTS

Central Electric Company,

264-266-268-270 FIFTH AVENUE CHICAGO

OKONITE IT NEVER DISAPPOINTS

To Fight the Telephone Trust Successfully

You must not only understand the telephone business but have local sentiment with you

¶ Here is a Sentiment-Creator—an Opinion-Maker. It has never been approached in point of interest or practical results.

¶ You cannot invest in anything which will help your business more than the absorbing book, "A Fight with an Octopus." Place a copy here and there in the hands of your influential citizens. They will read it, never fear, from beginning to end. And after they have read it, they will be your friends and will appreciate the value of Independent Securities and Independent Service. You will be made happy and your plans and your business will prosper.

¶ "A Fight with an Octopus" is a stirring story of the monstrous tactics employed by the Bell Telephone Trust in its efforts to throttle competition. It depicts in graphic style how one of the most colossal combinations of all time endeavored to stifle the voice of a people and retard the progress of a nation. It tells most impressively how the battle of Principle against Mammon won, and shows conclusively why the Independents triumphed—and predicts they always will.

¶ A 12½-cent-copy, judiciously placed, may gain you a subscriber for life.

¶ An investment of a quarter may win you a couple of good stockholders.

¶ A complimentary copy in your bankers' hands will open their eyes to the value of Independent securities.

¶ Give your doctors a gift book of this kind and they will tell what they learn from its pages in many homes where they visit. Send your councilmen and other city officials this book and note how it affects their attitude toward your concern.

¶ It is **the one, greatest, surest and cheapest educator** ever produced for the Independent field.

PRICES:

500 copies or more	- - - -	**12½ cents per copy**
250 " " "	- - - -	**15 " " "**
100 " " "	- - - -	**20 " " "**
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YOU NEED THIS BOOK IN YOUR EVERYDAY WORK

TELEPHONY PUBLISHING COMPANY = = MONADNOCK BUILDING CHICAGO, U. S. A.

THE IDEAL IRONITE DROP WIRE

Registered U. S. Patent Office

And when the "dog days" come and the fierce heat of summer makes your copper drop wires sag and stretch—frequently crossing with a light or power wire and causing much woe and expense—how you will wish you'd put in IRONITE twisted pair—the drop wire that will not sag or stretch.

It is not too late. Replace all the copper drops with IRONITE right away. IRONITE still costs much less than copper and always will cost less. Saves pulling up slack too. Get a sample.

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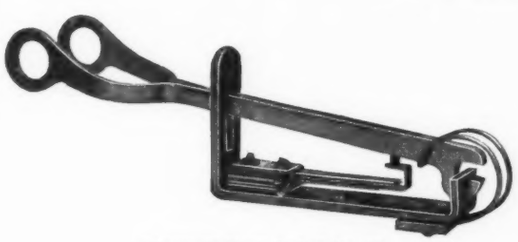
MIKE KINNEY SAYS:

"The Largest room in the World is the room for improvement."

(Mike wasn't a telephone man, but wouldn't you think so?)



"Central" Hook Switch No. 35

When You Buy Telephones

do you look at the cabinet or at the inside? Order a sample of our telephones and LOOK inside. Take our Magneto phone for instance,

AND EXAMINE OUR No. 35 HOOK

1 Self-contained.
2 Removable Lever.
3 Lever held substantially in place by double steel spring always under tension.
4 Lever hooks directly into base projection.
5 No Pivot Screw to work loose or bind.
6 German silver springs with platinum contacts.
7 Reinforcing spring below bottom contact spring.
8 Escutcheon and hook mounted with same screws to side wall of phone.
9 Lever and base insulated from contact springs.
10 Only hook on the market not using separate lever carriage.

Write for other good reasons why you should use our 1908 TELEPHONES

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The Weston Wire Chiefs' Voltmeter, Model 57, is an instrument specially developed with reference to the requirements of Telephone Companies. With it the Wire Chief is enabled to make rapidly and accurately a large number of the tests of lines necessary to locate the nature of defects and assist him in bringing and keeping the system under his charge up to the highest possible point of efficiency.

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An increase in efficiency of 25% has been reported as a result of the use of these instruments in large stations.

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THE NEW FOOL-PROOF PAY STATION

INVINCIBLE STEEL REGISTER PAY STATIONS

FOR MAGNETO AND COMMON BATTERY SYSTEMS

(Only One Gong) No Tapes No Different Sounding Bells No Chutes to Block (Only One Gong)

BUILT OF SHEET STEEL, FOOL AND BURGLAR PROOF. LOUD CODE SIGNALS.

A concealed register keeps account of all coins deposited, showing exact total amount in dollars and cents. **The "Invincible"** contains **no complicated mechanism, its coin holders clear themselves automatically and ELIMINATE tin tags, paper, wads, etc.**

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Write to-day for catalogue and special proposition, it will save you trouble and money. We will take your old pay stations in part payment.

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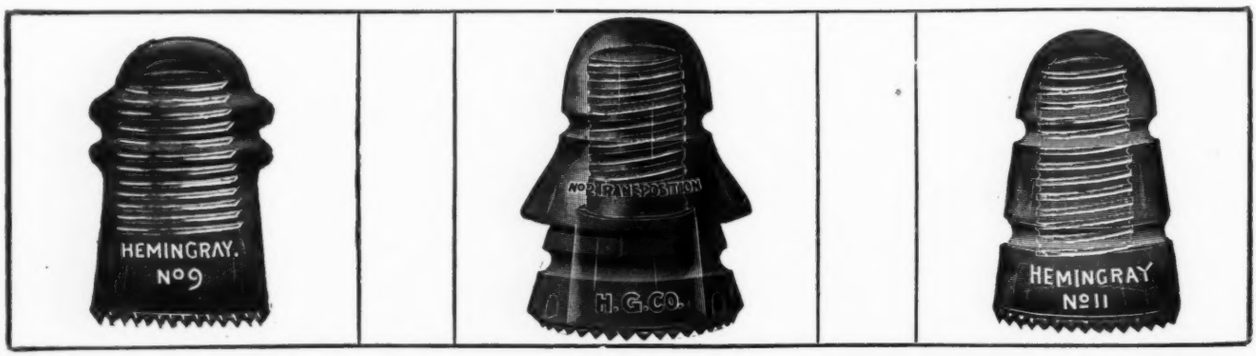
ALL WITH THE "PATENT DRIP PETTICOATS"



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Absolutely Guaranteed

Simple, efficient, economical. Only one battery of forty to fifty ordinary dry cells required. Works perfectly on all alternating and direct pulsating current ringing.

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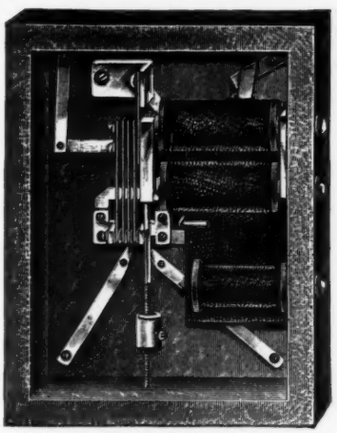

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Another Money - Saver

By using this instrument, you can carry on two conversations over any single, metallic bridging line without either conversation interfering with the other. Let us explain it to you.

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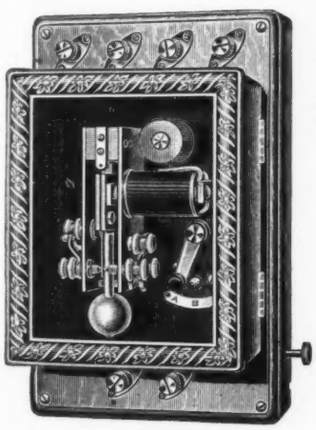
We guarantee both of above devices to be of the very highest standard. They have successfully withstood all tests of actual service and the keenest competition. The prices are attractive and the terms all that could be asked. **We want every telephone man to have full particulars.**

SPECIAL DISCOUNTS on All Orders for Anything in the Telephone Line including Switchboards, Telephones, etc.—Quality Guaranteed.

CURRENT ELECTRIC CO.

50 State Street Chicago, Illinois

"Do You Get Our Rings?"



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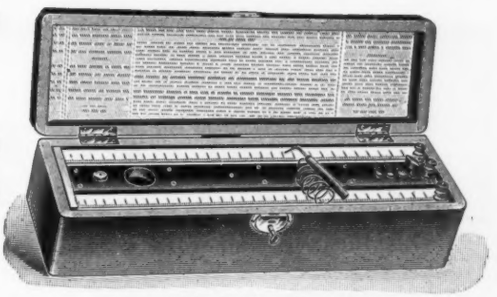
Are Still at the Head, Both in Economy of Operation and Cost of Maintenance



Patented Oct. 1, 1901—No. 683,622

OUR pole changer continually receives unsolicited testimonials showing extraordinary amount of ringing done with one set of batteries. Made in 4 styles and gives both A. C. and P. C.

"Ohmmeters." Sales in the past year have been unprecedented, simplicity in operation being the chief cause. Made both with galvanometer or receiver.

"Duplexers," with our efficient balancing device, are daily giving extra toll line service to many telephone companies at no other cost than that of the instruments.

"Lease Records" of the most up-to-date style are now in use by hundreds of companies.

All goods sent on 30 days' trial and guaranteed.

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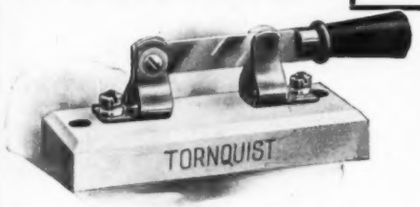

No. 41. Price, 14½c.

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YES—THEY ARE THE BEST! Send your order TODAY. If you don't find them right return at our expense.

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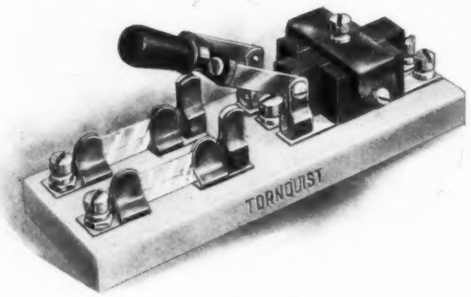

SEE THE CARBON SURFACE.

TORNQUIST NEW KING OF PROTECTORS, No. 45

The best on the market for rural lines. They protect you when the storm is raging. Why not the best? They cost no more. Do not delay ordering.

Price, each, 75 cents.

Tornquist Carbon Block No. 40
IT'S A WINNER

This is the block of carbon blocks and without exception the best on the market. Neat and compact, mounted on porcelain base. Note the construction.

Price, 22 cents.
For the next 30 days, price in lots of 100, 18 cents.

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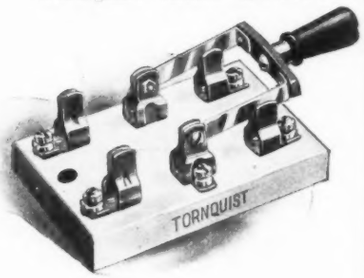

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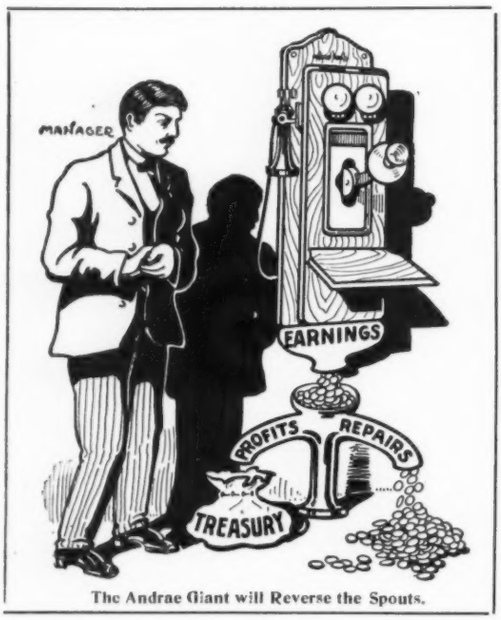

The Andrae Giant will Reverse the Spouts.

It's Not What You Make But What You Spend That Counts

It is an easy matter to buy a Telephone cheap and then spend three times its original cost in repairs. That is what is the matter with a great many Telephone companies. Whenever you find a first class A1 instrument with imported Tungsten steel generators, imported French granular carbon transmitters and imported Norway iron ringer cores, you will know that this telephone costs more to build than the telephones usually placed on the market, but it costs less money to the man who uses it, for while he may pay a little more in the beginning, he will pay much less in the end and get much more comfort and satisfaction out of the operation of his lines.

The principal characteristic of the Andrae Giant Telephone is the fact that the first cost is all there is to it. They require no livery bills, time and expense to keep them working. They work all the time. They do not have to be doctored, coaxed or petted. Put one on your line and it will take care of itself. This is because it has a construction so seldom found in telephone instruments. It is the kind that costs money but gives good service and long life. If you want telephones that are right when you get them and ten years after you get them, let us send you a couple of Andrae Special Heavy Giant bridging rural instruments on trial.

JULIUS ANDRAE & SONS COMPANY

48 Years in Business

217 W. Water St., MILWAUKEE, WIS.

BE FAIR

Don't condemn the ROBERTS SYSTEM unseen just because other lock-out systems have proved failures.

A few distinctively ROBERTS features:

(1) Full selective ringing for any number of parties on one line.

(2) Absolutely private service without interference.

(3) Instantaneous emergency connections. Any subscriber, although locked out, can signal central at any time.

(4) A subscriber calling in when the line is busy is automatically notified by the operator when the line is free. If two or more subscribers call in when the line is busy, they receive service in proper sequence without further effort on their part.

(5) The operator has at all times and under all circumstances full control of every telephone on the line.

(6) An operating speed impossible with any other party line system.

(7) No "rubbering" doubles the life of the local cells.

(8) The voltage of the local cells at each station may be accurately determined from the central office.

(9) The nature and location of almost all conceivable kinds of line trouble may be determined by the switchboard operator.

For a description of the mechanical and electrical features of the System that accomplishes the above and many other remarkable "stunts," address,

HOMER ROBERTS TELEPHONE CO.

1703 Melrose Street, CHICAGO, ILL.

Corwin Automatic Inter-Communicating Telephone System

Type E

This system does away with Jacks, Plugs and Cords, replacing them with a single button for each line at each telephone. Simplifies circuit connection. Avoids breakage of cords, short circuiting and poor connections. Has a combined ringing and talking key, which will stand continual wear. Mechanical action positive. Electrical contacts absolutely reliable.
Avoids confusion and economizes time and expense.

Write for Illustrated Bulletin

CORWIN TELEPHONE MANUFACTURING CO.

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Please tell the Advertiser you saw his Announcement in TELEPHONY.

Unitype Switchboards

Embody

Durability Accessibility Simplicity

And Every Necessary Feature for Successful Operation

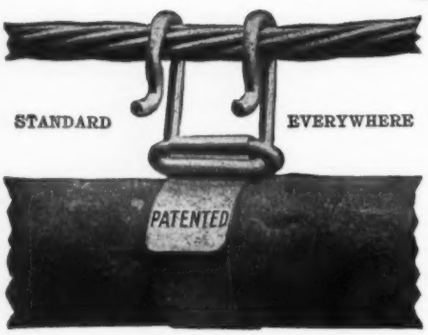
NO Springs
NO Double Windings
NO Extra Jack Contacts
NO Small Complicated Parts
NO Trouble

SEND FOR BULLETINS

THE SUMTER TEL. MFG. CO.

SUMTER, S. C., U. S. A.

We are Offering These Two Articles at Attractive Prices



Get In Line!

"Boston" Cable Clips are best, simplest, strongest, and are the most satisfactory on the market today.

Easily applied and do not cut cable or supporting wire.

"Shawmut" Ground Connection Clamp

is made in sizes from ½ inch to 3 inches. An all copper clamp, copper plated bolt, strong construction, and especially adapted for use in grounding wires.

Maximum Contact Surface

Send for Descriptive Circular and Prices

CHASE-SHAWMUT CO.

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MOTOR R-S CYCLES

BUILT AND TESTED IN THE MOUNTAINS.

AMERICA'S BEST MOTORCYCLE

It is a sweeping claim but it is a machine that justifies the claim.
No motorcycle incorporates more features, and every feature is a useful one that must appeal to the practical man.

The machine telephone companies are looking for, simple, strong, economical. The machine can be fitted with R-S" luggage carrier. The ideal machine for the collector, lineman, trouble hunter, etc.

In Our Reading Standard Bicyles

we present the most complete line ever offered to dealers or the public—standard diamond frames, two types of truss frame, large sprocket models. Not many orders can get past the up-to-the-minute Reading Standard Agent.

READING STANDARD CO. READING, PA.

READING STANDARD Co. READING, PA. U.S.A.

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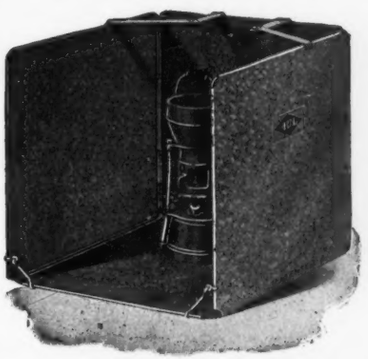
Single Eye | Double Eye | Split Grip (applied) | Split Grip (open)

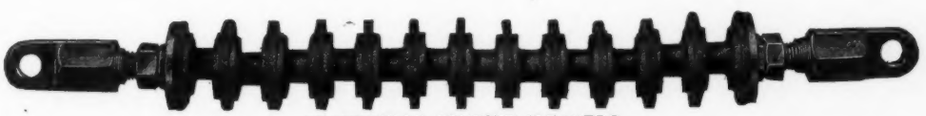
"Mul" Cable Construction Devices



PERFECTION FURNACE PROTECTOR

"Gem" Cable Grips save their cost in every pull in installing cable, either aerial or underground. The harder the pull the tighter the hold.

"Mul" Perfection Furnace Protectors are so constructed as to give the greatest life and withstand an excessive amount of rough usage. They cannot tip or blow over.



"MANDRELL" CONDUIT CLEANERS

Colman J. Mullin MUL 430 Kent Av., Brooklyn

"Mul"—"The Diamond on the Square"

LOADING AS ATTACHED

"DROP A NICKEL"

Always Ready—Convenient—Safe
Only $1.50

Certainly a Convenience Almost a Necessity

A Nickel Phone is only Half a Phone Without it.

Holds 30 Slugs or Nickels. A pressure on the plunger drops one in the slot. Never needs attention. Use the same nickels month after month.

We control absolutely the device described above. We own the patents on the same which are so broad as to insure complete protection. We have a complete set of dies, tools and patterns for its manufacture. We have already manufactured 1,000 of these attachments which are all boxed and labeled. We have not yet started to market the device but a few have been sold and in every case are giving complete satisfaction. There are over 81,000 of this type of telephones in Chicago, there are nearly 500,000 in the United States and more being installed constantly. We are incorporated for $2,000 under the laws of Illinois, fully paid and desire to sell either the entire Capital Stock or a controlling interest. This is necessitated by the removal from the state of our president and the inability of the other directors to devote the time necessary to the business. We are willing to give the buyer all the best of the bargain and will welcome the fullest investigation. This is a snap for an established firm organized to market such an article or for someone who is looking for an opportunity to build up a large, profitable and dignified business from a small initial investment.

If you are interested and will address us as **"M. A. Co.,"** in care of TELEPHONY we will arrange an interview and give you all particulars,

Hello! Hello!!

"Give me the Manager's Office":—
"Is this the Manager's Office?"

"Mr. Manager, would you like to save a good pot of money in your construction and repair work?

You can do it by putting your trouble men on **Armac** Motor Cycles.

Wherever tried by telephone companies, they have been very successful and a great many machines are doing good work.

A Chicago city telephone inspector receives $180 a year for car fare which has more than paid for the machine the first year."

This man has ridden an **Armac** two years, 25 miles every day, without a breakdown; so can you.

The **Armac** Motor Cycle is the product of a $100,000 factory that is turning out the best material and workmanship—

EVERY *ARMAC* IS GUARANTEED

It is a durable, strong machine, one that can be depended upon and will stand the racket of rough roads.

A fixture can be attached that will carry tools and wire over rear wheel.

The Motor Cycle is a necessity for telephone service.

Write to us and we will send you information that will be of great value.

Armac Motor Co.

1221 Michigan Avenue
Phone Calumet 3946

Factory
472 CARROLL AVE. **Chicago, Illinois**

RELIABILITY

TRANSMITTERS

POWERFUL

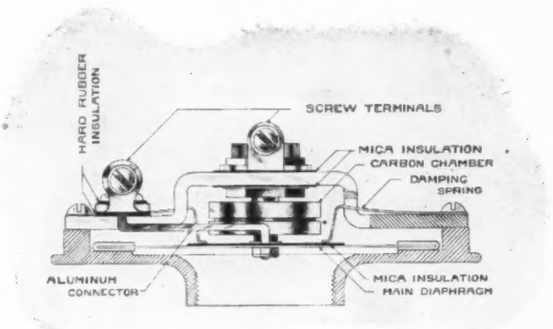
SENSITIVE

The dampening springs extend through the bridge and bear upon a mica washer in the center of the diaphragm where the dampening effort is needed.

They are made of German Silver which maintains the proper tension indefinitely and does not rust.

There is no felt or rubber to come off the tips of the springs.

The secondary diaphgram is tuned to the average pitch of the human voice, therefore very sensitive.



Highly polished hard carbon electrodes are used in the front and back of the carbon chamber.

The carbon granules are pure hard coal.

None better can be obtained.

The terminals can be reached from the side by a screw-driver, which is a convenience not found on any other make of transmitter. Mica and hard rubber are used to insulate all parts from the frame.

If the transmitter is too powerful for local service, use one dry battery only.

THEY ARE GOOD LOCAL BATTERY

AND

COMMON BATTERY THEY STAY GOOD

Cracraft Leich Electric Co.

Genoa, Illinois

Established 1820

Switchboard Cords
Receiver Cords
Desk Cords

Cables
Weatherproof Wire
Rubber Covered Wire

ALFRED F. MOORE
200-218 N. 3rd Street, PHILADELPHIA

THE SILENT MESSAGE.

BY PAUL H. WOODRUFF.

THE new night operator looked bored—not because of any overwhelming volume of work, but rather due to the lack of it. She glanced at the big clock.

"Only ten o'clock!" she exclaimed. "Gee, but it's dead around here."

A lamp in the switchboard suddenly flashed up.

"Well! A call, of all things!" murmured Miss Nolan sarcastically to herself. Then hesitated. The signal had gone dark again.

"Don't be bashful," she said mockingly. The lamp, thus adjured, began a series of fitful flashes, which Miss Nolan interrupted with a stab of the answering plug.

"Number, please?" she said sweetly; then as the only answer was an irregular clicking in her receiver, "number, please; number, please; *number, please?*"

No answer.

She jerked out the plug impatiently, and glared at the lamp. The flashes continued.

"Some kid monkeyin', I'll bet," she muttered. She seized the calling plug and sent vigorous ringing current over the offending line. Then she listened in.

Nothing happened.

"Shoot the old thing!" she exclaimed angrily. "I'll not waste my time on it."

She attended to one or two other calls in the next five minutes. Meanwhile the lamp flashed on serenely.

Ten minutes later she again tried to get into communication with the persistent party, with no better results.

"Is it a deaf-mute trying to telephone?" she asked herself. "If the line was out of order I think the lamp would burn steady for a second or two at least, and not be bobbin' up and down all the time."

"ACME"

Rubber Covered Telephone Wires

The word "Acme" indicates the quality of wire we manufacture. Nothing better made because it is the best made.

Our weekly capacity is over

2,000,000 Feet

Your orders are assured of prompt and careful attention. Write us for samples and quotations.

The ACME RUBBER MFG. CO.
TRENTON, N. J.

The New "Chicago Grip"
M.KLEIN & SON
SPRING WORK
will soon be upon you
KLEIN TOOLS
will be in DEMAND. Your Work will soon be completed if timely you have them ON HAND. Send for catalog, select your requirements and let us fill your order in good time.
Mathias Klein & Sons
83 W. Van Buren Street
CHICAGO, ILL.
All supply houses carry our products.
M.KLEIN & SON

She tried to think of other things, but she had to watch the board for other calls ,and anyway she could not help looking to see if the lamp was still misbehaving. And so the little eye stared her in the face and winked steadily on, and she gazed, fascinated.

"I saw an old man yesterday with a horrible film over one eye just that color," she muttered, with a little shudder.

The thing was beginning to get on her nerves, as little things will sometimes when one is alone at night.

Suddenly she had an inspiration.

"I'll call up Jimmy and tell him about it," she said with a sigh of relief.

Jimmy Powers, wire chief, lineman and trouble-shooter, was resting at ease in a big chair with his unshod feet reposing on the center-table and the stem of a corncob pipe between his teeth. He did not stir when his telephone bell rang, though his placid features gathered a frown of annoyance. The telephone had been installed in his room by the company for emergency calls.

"I've a good mind not to be home!" he muttered. "After the day's work I've put in, holdin' down three men's jobs, I s'pose I've got to go out again."

He approached the ringing instrument with deliberation. "Well?" he said finally, with some force.

"Oh, Jimmy, is it you?" asked the receiver in a well known voice.

"Hello, Mary!" exclaimed Jimmy, winking at himself.

"Go on with your teasing now, Jimmy. You know this is Betty Nolan."

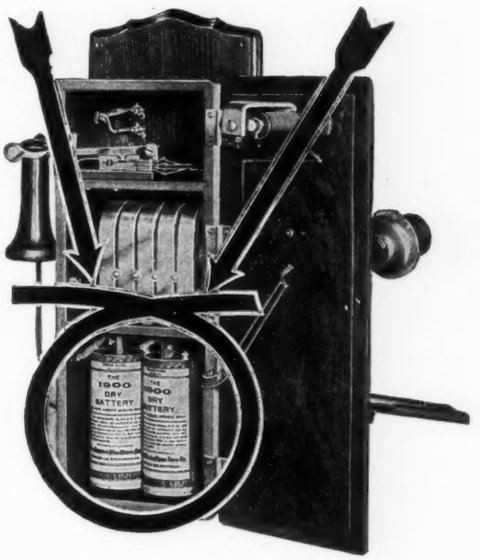
"I was just tryin' you, sweetheart," murmured Jimmy.

"Well, save that. There's a line here acting very queer—the lamp is flashing all the time."

"Let her flash!" said Jimmy promptly. "What do you care?"

Do Your Telephones Look Like This?

THEY SHOULD!



The Nungesser Electric Battery Co.

CLEVELAND, OHIO

General Sales Office: 128 W. Jackson Blvd., Chicago.

OPTIMISTIC

We have every reason to feel so.

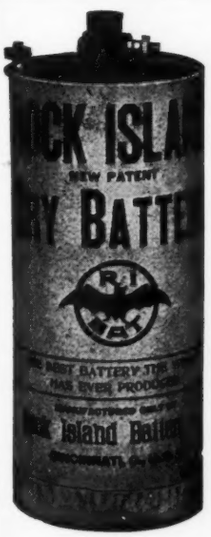
OUR BIG plant is running **overtime** and we are just finishing an addition that will give us 5000 more square feet SPEAKS WELL for our product.

NORTH
EAST — WEST
SOUTH

Sending us their requisitions every day. A TRIAL ORDER will convince you.

ALL SIZES

STACKPOLE BATTERY CO., ST. MARYS, PENN.
CARBON PRODUCTS



Economy in Service

Not only best service, but cheapest service is assured Telephone Companies who use

Rock Island
New Patent
Dry Cells

They are made right. Last so much longer than other dry cells that their cost is actually far below batteries that have failed to show in competition with them.

Standard No. 8 (3½x8 in.) and No. 6 (2½x6 in.) have proved BEST in every test. Booklet FREE.

R·I BAT

ROCK ISLAND BATTERY CO.
903 Sycamore Street, CINCINNATI, O.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

The Largest Manufacturers of Glazed Earthenware in the World

Factories in Five States

American Sewer Pipe Company

CONDUITS

GENERAL OFFICES: **PITTSBURGH, PA.**

"I can't get the party at all."

"That's his loss," responded Jimmy.

"But it's—it's winkin' at me, Jim!" exclaimed Betty desperately.

"The blaggard!" said Jim. "Where does it hang out, Betty?"

"It's in the jewelry store at fourteen Main street. I looked it up.

"Why, that's just around the corner from here," said Jim. "What is it you want me to do?"

So the operator told him about the strange actions of the lamp signal, and about the old man's eye, and that she was all alone to-night and that she was getting nervous.

"It's been flashing for twenty minutes now," she said.

"Quite a while to be playing," said Jimmy reflecting. "I'll go over and beat him up."

"Anything you like, Jim," said Betty wearily.

Jimmy pulled on his boots and coat, slammed a cap on his head and started out. Then he paused. He did not feel right, somehow. His eye fell on his testing box, and he tossed the strap over his shoulder.

"Been carryin' the blame thing so much I don't feel natural without it," he muttered.

Whistling a lively tune he went out into the street.

At number fourteen Main street he paused in wonder. The store was dark.

"Guy must have quit monkeyin' and gone home," he observed. "Guess I might as well do the same."

As he turned, he gave a sort of parting slap to the door handle. Then he stopped still, with a realization that something was wrong. The door was unlocked.

Cautiously now, quietly he opened the door just enough to apply his eye to the crack. The interior was black as

If You Are a Quality Man

differentiate yourself. A high quality card always indicates a high quality man, and a high quality man always sells high quality goods.

Peerless Patent Book Form Cards

are the highest quality cards, because they have smooth edges and show no indication of having been detached from book. Beautifully engraved, they fix your status when you present them. Nothing better can be bought. Nothing finer can be made.

Your card represents your individual taste, your degree of culture, your business judgment, and is a sure index of your calibre. Cheap men use cheap cards, represent cheap houses and sell cheap goods.

You owe it to your house; you owe it to yourself to use **Peerless Patent Book Form Cards.** Write to-day for samples and prices.

Our Smart Card in Case

The John B. Wiggins Company, Sole Manufacturers
Engravers, Plate Printers, Die Embossers
30-32 ADAMS STREET, CHICAGO

Do You Want Telephony's

1908 Directory?

If you do, fill out and return this blank

Today

Book Just off the Press

If you don't return this blank promptly, you may not secure the book.

TELEPHONY PUBLISHING CO., Chicago,

Gentlemen: Please send me by return mail, postage paid and without cost, a copy of TELEPHONY's 1908 "Directory of the Telephone Industry;" also, send me TELEPHONY until ordered discontinued, for which I agree to remit at the rate of 8⅓ cents a month.

Name _____

Post-office _____

Date _____ 1908. State _____

pitch; but in one corner a very faint spot of light flashed here and there. Jimmy held his breath and watched.

Hither and thither moved the spot of light, like some Will-o'-the-wisp, stopping and moving on again, noiseless and deliberate. Then it suddenly turned and approached the door. Jimmy crouched in the shadow.

As the door opened, he almost heaved a sigh of relief. Somehow, he had expected to see a villainous looking apparition appear. Instead there stood before him a dignified looking man, whose clothes Jimmy could see even in the dimmest of street lights, were of the best.

"Sure, it must be the jeweler himself," thought Jimmy.

The tension relaxed, he remembered his mission. He stepped out and confronted the stranger.

"Are you the gent—" he began. Then he stopped. He had suddenly realized that he was face to face with the hollow end of a substantial looking revolver, and that the eyes of the man behind it had taken on a peculiar, desperate look.

A sudden sickening crash and a moan, and a huddled figure lay on the sidewalk, while the revolver rolled into the gutter. Jimmy had swung the heavy testing box straight at the man's head.

"Nobody pulls a gun on Jim Powers," said that individual, "no matter whether he's on the square or not."

As Jimmy gazed at his handiwork on the sidewalk, he observed a short, stout figure approaching down the street with the care-free saunter peculiar to those "on the force."

"Here's the boy will take it off my hands and let me go home," thought Jimmy.

The figure in blue gazed curiously at the scene.

"Is it a criminal ye are turning, Jimmy?" he asked.

"Just boxin' the man's ears," said Jimmy casually. "Pulled a gun on me."

The officer turned the unconscious face to the light.

"Hm!" he exclaimed. Then he stepped into the open

Have You

a subscriber on a party line who wants to call the switchboard without his neighbors knowing it?

You can accommodate him by giving him a **"Duplex" Secret Service** 'phone.

Works on any line; no change in your line, switchboard or other instruments necessary.

Our Bulletin No 10 tells all about it.
Write for it.

Long Distance Telephone Mfg. Co.
Makers of "Better Telephones"
SOUTH BEND, IND.

YOU DON'T HAVE TO HOLD THE "Flexiphone" IT HOLDS ITSELF

- ¶ This is not the only point in favor of the FLEXIPHONE.
- ¶ It positively does away with broken Transmitters and Receivers.
- ¶ It overcomes those annoying Cord troubles.
- ¶ The ideal instrument for the Office or Home.
- ¶ Now used by many leading exchanges.

YOUR MAINTENANCE ACCOUNT IS REDUCED ONE-HALF

Mouthpiece revolves, always facing user.
Self-balancing in any position.
Attachable to any desk or woodwork.
Supplied with any Transmitter and Receiver.

MANAGERS SEND FOR SAMPLES AND PRICES TODAY.

OLIVER MFG. CO., Inc.
1020 Walnut Street
Philadelphia, Pa.

Holtzer-Cabot Electric Co.
395 Dearborn St., Chicago, Ill.
Boston, Mass.

WE EXCEL IN "QUALITY"

"TELEPHONES"

TELEPHONE SUPPLIES — B-R TRADE MARK — OUR SPECIALTY

BEST MATERIALS USED IN THE CONSTRUCTION OF OUR

TELEPHONES AND APPLIANCES

The B-R Electric & Telephone Mfg. Co.
KANSAS CITY, MO. and PORTLAND, ORE.
ASK FOR CATALOGUE

door of the jewelry shop. A moment later the electric lights flashed up, and the store was light as day.

"Give us a lift, Jim," said the officer, and together they bore the inert form into the store. Then Jimmy took occasion to look around.

"Holy Moses!" he exclaimed in a startled voice.

In a far corner of the store his roving eye had discovered a strange figure. It was that of a man of middle height and age, seemingly without any arms. His jaws were distended to the utmost, and in the cavity thus created was packed tightly some white substance. Closer inspection proved the substance to be a towel, and the armless effect, viewed from the rear, resolved itself into a pair of tightly bound wrists.

The gentleman being soon freed of these physical incumbrances, proceeded at once to relieve his mental self, which he did thoroughly and enthusiastically, to the admiration of Jimmy and the policeman.

"If you had only come a few minutes sooner you would have caught him as he went out the door," said the jeweler.

"It will surprise ye to know that the man is in your store this minute," said the policeman. "Jimmy here fetched him a crack that'll keep him in the hospital for a while. I suppose ye can prove ownership on this, sir?" and the officer produced and opened a black silk bag, the sight of whose contents almost made Jimmy yell. Diamonds, large and small, set and unset, sparkled in the electric light like a handful of stars. Among the gems lay a half dozen big gold coins.

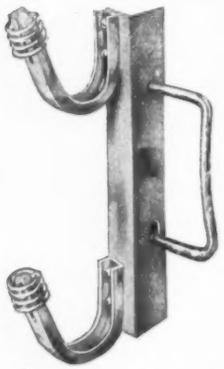
"Mine! all mine!" shouted the jeweler, reaching for the bag.

The officer closed a huge fist over it.

"I'll have to be holdin' it out on ye," he said, "but you'll get it as soon as court opens in the morning."

YOU

Have a good many reasons why you should send for our FREE BOOKLET explaining how cheaply you can transpose your circuits with low labor costs and no repair expense. Always grasp a chance to save money. Write right now.



PEIRCE SPECIALTY COMPANY
ELKHART, IND.

A NEW PATH

There's a brand new path in Tool Steel—the working of it. A shorter, straighter, easier followed, and many times cheaper than the old circuitous route of boring out solid bars or rods, wasting half or more of your steel in "borings" or "turning" and **all** your time in doing it—cost to you of both. The new path is in

Seamless Tool Steel Tubing

sent to your shops bright, smooth and clean—no "scale" on it—in precisely the size, both inside and out, to the micrometer dimensions you tell us to make it. Simply cut in the lengths you want it, "temper" as you wish, and the trick's done. Same gain in

Low Carbon Steel Tubing.

Now isn't that a new path and a quick one? Saving to you? You'll find interest compounded as told in our Price List, sent to you for the asking.

WE ALSO MAKE BRASS TUBING, COPPER TUBING, ALUMINUM TUBING. From the size of a man's arm to the diameter of an eye lash. All Seamless and Extremely Accurate

ELLWOOD IVINS TUBE WORKS

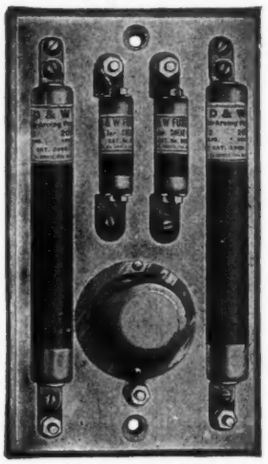
Main Office and Mills,
Oakland Station, Philadelphia, Pa.

315 Chamber of Commerce, Chicago
487 Broadway, New York

D&W TELEPHONE PROTECTORS

—AFFORD CHEAPEST INSURANCE—

FIRE and Liability LOSSES Eliminated



Approv'd by the National Board of FIRE Underwriters

"D&W" Fuses Protect

:: Send for Circular No. 102-T ::
Write for Prices on Quantity Orders

D & W FUSE CO.
PROVIDENCE, R. I.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

"Let me see them again," requested the owner. He took out three of the gold pieces, and gravely handed one to the policeman.

"My compliments," he said.

"Thank ye kindly, sir," responded the officer, "and ye understand, sir, the necessity of sayin' nothin' about having touched the evidence. Though 'twas Jimmy here did the good night's work be smashing 'High-roller Pete.'"

"Oh, you know the boy?" asked Jim with interest.

"We've his picture hangin' at the club. And," he whispered, "there's a small matther of a reward for him, I'm thinkin'."

The two remaining coins the jeweler now handed to Jimmy.

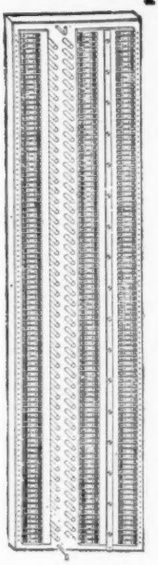
"One for yourself," he said, "and one for the operator whose knowledge of the code saved my property.

"I cannot help but feel a certain wonder," he went on, "at the way in which odd bits of knowledge, put aside as useless, become suddenly of great value. Who would have dreamed that the Morse code, the telegraph alphabet I learned as a boy, would save me thousands of dollars? See here, how I worked it?" And he illustrated how, with his arms tied, he had worked the switch-hook up and down with his elbow, sending the call for help in luminous dots and dashes over the line.

"'Tis a beautiful thing," said Jimmy, "and I hate to spoil it by tellin' you that neither myself nor Betty Nolan knows the Morse alphabet from the Skandahovian language. But thank you just the same, sir, and good night."

"'Tis a reward I'll be getting, Betty darling," he reported a little later through his own telephone. "Who would have thought that the old man's fishy eye winkin' at you out of the switchboard would be the means of settin' us up in our own little flat in a few days, sweetheart?"

The Popularity of Security



Cross Connecting Panels Never Ceases

Their convenience, compactness, ease of installation, remarkably high insulation and low price accounts for their adoption to-day as it did years ago when first brought on the market.

Booklet Number Six Tells The Story. Write For It.

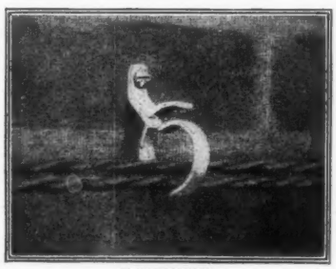
THE F. BISSELL COMPANY.
TOLEDO, OHIO

Diamond Expansion Shield and Screw Anchor

D-X BRIDLE RING

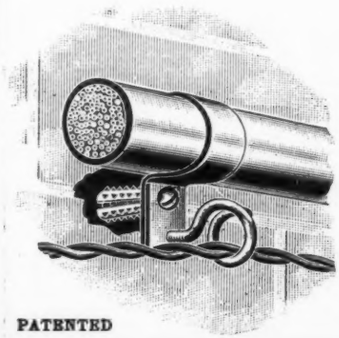
Quickest to Fasten, Strongest and can be fastened to wood or stone—by using Screw or Expansion Shield. Galvanized or Enamel

SEND FOR PRICES AND CATALOGUE 44-E



PATENTED

LONG SAUT CABLE CLAMP



One attachment carries both lead Cable and Bridle wires in interior block distribution. Does not injure cable.

PATENTED

Diamond Expansion Bolt Co.
90 West St., corner Cedar
NEW YORK

Cable Pole Seats
Cable Reel Jacks
Manhole Cable Hangers
Cable Winches
Pipe Bends
Pole Raising Wagons

Write for Descriptive Matter and Prices.

Anderson Forge & Machine Co. DETROIT, MICHIGAN

Exchange Managers!

Just What You Need!

One of our self-winding clocks on your Toll Operator's desk will prove of great value. These are built especially for such service and you cannot fully appreciate the value of correct time, **always,** until you have one. Special prices to Operating Companies.

MOUNTAIN STATE ELECTRICAL CO.

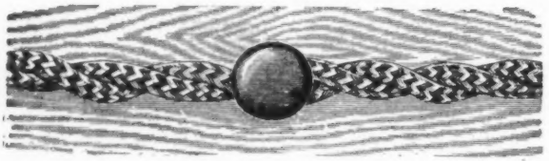
WHEELING, WEST VIRGINIA

"MILONITE"

Trade Mark

Perfection Insulated Nails

Patented Jan. 13, 1903



Milonite Perfection Insulated Nails for installing double insulated wire have been adopted by the leading telephone companies throughout the country.

1 Easy to handle.
2 Prevent short circuiting.
3 Color matches wire or wall.
4 Wire can be taken down without cutting or injuring insulation.

No. 22 No. 20 No. 18 No. 15

Diameter of head in four sizes. Lengh of nail to suit.

Samples and prices upon application.

Manufactured by **MORLEY MFG. COMPANY**

118 Boylston Street, BOSTON, MASS.

"Ah, go on with you, Jimmy," said Miss Nolan, archly. "Ain't you ashamed to be sayin' such things to me—over the telephone?"

A NEW INDEPENDENT TELEPHONE ASSOCIATION.

MAY 21, 1908, the Mississippi Independent Telephone Association was organized at Tupelo by an enthusiastic group of telephone men from different parts of the state. Temporary officers were elected, J. B. Shannon being made president and D. F. Eastman secretary. Another convention will be held this month to elect permanent incumbents of these and other offices.

There are now five thousand telephones in Mississippi and the number is constantly growing, providing a fertile field for the operations of the new association.

WHEN THE TELEPHONE FAILS.

ONE does not realize until service has been cut off, how strong in us the telephone habit has become, says the New York Sun.

"You know," said Mr. Blinxloly, "the old saying about how we never miss the water till the well runs dry.

"And how true that is of many other things besides wells! Take, for instance, telephones.

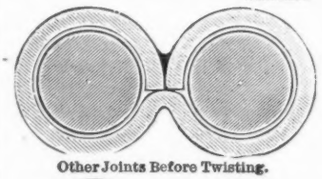
"True, the drinking of water is an ancient and ingrained habit, one coexistent in fact with the existence of man, while using the telephone is a habit modern and acquired; and so when things are running smoothly we don't realize how deep seated and firm and pervading the telephone habit has come to be with us; but let anything happen to the telephone and then we miss it, and in its way as much as we would the water from the well run dry.

"Suppose we take down the receiver and hold it to our

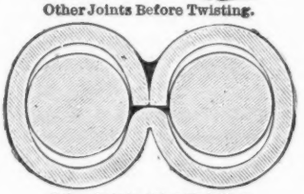
A PERFECT JOINT IS MADE BY

The Harvard Self-Welding Wire Joint

Patented

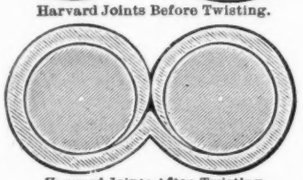


Other Joints Before Twisting.



Other Joints After Twisting

Harvard Joints Before Twisting.



Harvard Joints After Twisting.

The little diagram here shown almost tells the story. A sample (sent **free** for the asking) will tell the rest. Ask for one, twist it up yourself, cut it in two and see an absolutely **perfect joint.**

In the Harvard Joint the mere act of twisting forces the beveled edges of the sleeve into the recesses between the wires and the joint, gripping it absolutely tight around both wires, making a perfect weld.

A Joint made with the **Harvard Self-welding Wire Joint** is stronger than the wire itself.

When a twisted joint is cut in two it is almost impossible to tell where the metal in the joint stops and the wire begins.

Moisture or air cannot penetrate and corrode the wire and the joint, therefore you are always sure of a good connection with the **Harvard Self-welding Wire Joint**

The beveled edge does it. The more you twist the tighter it grips.

ALL SIZES—FOR COPPER OR IRON

HARVARD ELECTRIC COMPANY

CHICAGO Sole Manufacturers NEW YORK

ear with the usual cheerful, easy confidence, expecting the usual prompt connection, which in fact this time we do not get. And then we jiggle the bell a little, gently, mildly, to call attention of the boy running the switchboard below; he may be out at the front door looking at the boys playing ball in the street or around the house somewhere, and we wish to remind him gently and nicely that there's somebody waiting for him on the telephone.

"And then standing there holding the receiver our patience begins to ebb a little and we don't feel quite so tranquil; but we hold ourselves in and jiggle the bell once more gently, but this time with perhaps a little nervousness in the touch; and then we wait some more, but now, it must be confessed, with a feeling of exasperation creeping in on us; and then unless we are of more than human clay we find ourselves a minute later jiggling the bell with rapid energy twenty, thirty, forty times, wondering why we can't get that telephone. And at last the boy comes up and tells us coolly that the telephone is out of order, and we hang up the receiver.

"And with that act we become conscious of the fact that we are shut off from the world completely. A minute before we were in connection with the whole world; we could reach anybody and everybody anywhere on earth; we were neighbors with all creation; whereas now we are shut off from everybody and as completely isolated as if we'd been stranded on a spot of land just big enough to hold us in the middle of the ocean.

"To be sure, we could go out and telephone from somewhere else if we wanted to, but there we'd be in a strange land; and the fact remains that so far as we ourselves are concerned, here, in the midst of our own belongings, we are left shut in and alone.

"And positively the whole building seems still and dull,

Others Sought It We Found It

That is, an **Anchor** construction to pull against solid, undisturbed earth **Worthless** unless **Tightened** by the necessary tool. **Atlas Setters** do it.

FULL PARTICULARS

The Atlas Anchor Company

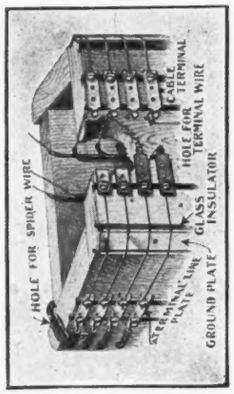
Cleveland - Ohio

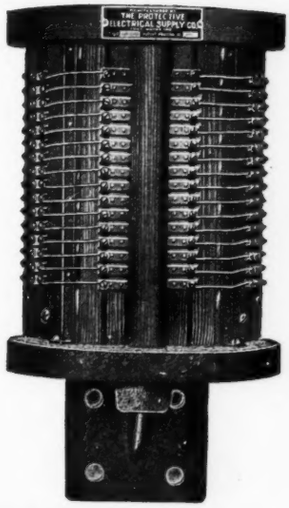
!BEWARE!

OF THE TERROR OF THE COUNTRY— THE INTERURBAN LINES.

PROTECT YOUR CABLE AND EXCHANGE with

Protective Cable Terminals





Absolute Protection
Low Maintenance

Write for Prices and Booklet.

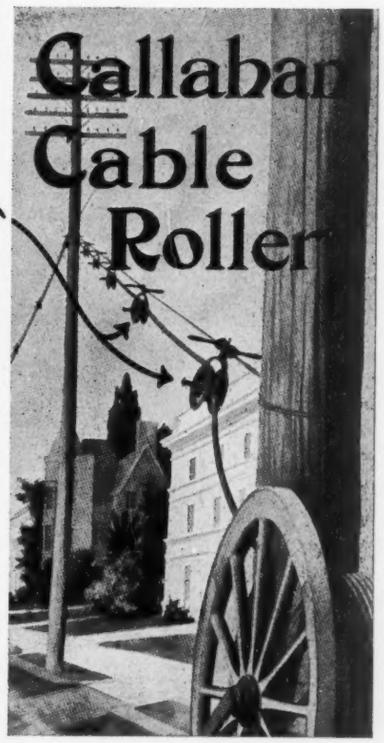
Manufactured by

The Protective Electrical Supply Co.

FORT WAYNE, IND.

You'll welcome this

Makes the stringing of overhead cables easier, cheaper, quicker. Stands hard knocks and abuse. There's only one size and that fits any size messenger wire. No bolts or nuts to fool with, nothing to be undone or unscrewed to get the cable out. Two men can put up 50 rollers in a short time. Then you can pull 12,000 ft. of cable any day. See the saving?



List Price $2.00 each, subject to Liberal Discount.

W. N. MATTHEWS & BROTHER

26 North Second Street **ST. LOUIS**

Insulation

No. 45 Cable Wax

Will do away with Cable Joint Failures and bring joy to all telephone men.

Underground work done with ***No. 45 Cable Wax*** is as durable as the conduits themselves.

WRITE FOR QUOTATIONS

Massachusetts Chemical Co.,

FRICTION TAPE Guaranteed

Operating
WALPOLE VARNISH WORKS.
WALPOLE RUBBER WORKS.
Walpole, Mass.

without life. Around us things are going on, we know, and the whole world is busy, but we are lifeless, dull, inert, cut out of the world's circulation; and so we wait, while the repair work is being done, for life to come back to us, to be once more connected; and then, suddenly, breaking in on this dull, lifeless quiet, the telephone bell!

"Ringing loudly, vigorously, cheerfully, absolutely joyously, as if it itself were glad to get back into business again and glad to make things pleasant for you, as it certainly does. And then you take down the receiver again and call up, and this time you get in a jiffy the number you want; and as you talk now over the wire your isolation is ended, and you expand with the consciousness that you have come back into the world, that you are once more of it and in touch again with all creation.

"We never miss the water till the well runs dry, nor the telephone till it goes out of commission."

A WORD FOR THE TELEPHONE POLE.

IN THESE days when there is so much talk about the "city beautiful," tending to stir up opposition against pole construction, it is refreshing to meet a tribute to the telephone pole such as appeared recently on the editorial pages of London Daily Telegraph. It is rather unique to find an instance of a man planting poles merely for their artistic effect, yet the writer of the editorial declares he has known of such cases.

"A man who cannot see the nobility of the long line of tall giants crossing the bare shoulder of a distant hill has little of the artist and nothing of the poet in his constitution," says the London journalist. "Silhouetted against a sunset, they have their own especial value, and modern artists have not failed to see their beauty in less obtrusive places. They form a black thread in the embroidery of

BLAKE SPECIALTIES

Recognized as Standard by all Telephone Companies

Compressed Cleats Hold the Slack. No Breakage

Insulated #1

Staples

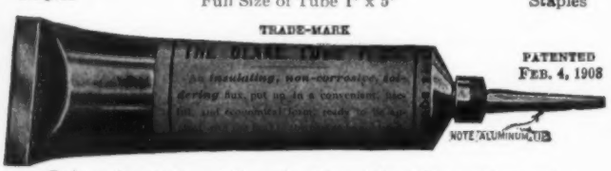
Insulated Staples, the only Mechanically Correct Method of securing wires with a driven fastener.

Tube Flux for Soldering. Insures a good quick job.

Full Size of Tube 1" x 5"

Insulated #5

Staples



Prices Quoted and Samples Furnished Upon Request

Blake Signal & Mfg. Co.

Manufacturers

246 Summer Street Boston, Mass,

1 Gallon **Faultless** 1 Gallon

Insulating Compound

"TRUE TO NAME"

For
Pot-Heads
Terminals
Telephone Cables
and
Cable Splicing

MANUFACTURED BY

CANDY & COMPANY

102-108 N. Lincoln Street

CHICAGO :: :: ILLINOIS

nature, and only those who have studied embroidery know of what infinite use that black line is in art. It must be used sparingly, as sparingly as gold, but its effect it as noble, and far more refined. . . . No artist, except your early Victorian dilettante, would dare to leave the poles out. I have known men willfully and with vast wisdom aforethought put them in where they never were."

Sentiments like this should be welcome to the telephone men who are criticized for their "ugly poles," as they are so often called. No doubt, however, the advocates of underground construction would not attach much weight to the English writer's ideas on the subject.

The National Telephone Journal makes the following sensible comment on the matter:

"It is not probable that the 'peepul,' who elect our councilmen, who order us to put our wires underground, will ever adopt this fanciful Englishman's view. Yet it is well to bear in mind that if we have poles, and are likely to have them for some time to come, it is much better to look upon them graciously than to curse them unreasonably. And the logic that applies to poles may hold good for many other things."

TELEPHONE EXPANSION IN THE WEST.

ASSESSED valuation of the telephone and telegraph lines in Umatilla county, Oregon, southwest of Spokane, has increased twenty-six times, while the actual length of the lines has increased from 321 to 844 miles. The lines were assessed at $20,595 five years ago, while last year the figures were fixed at $549,040. Much construction has been done in the rural sections, connecting farming districts with Pendleton and other towns, making a network of lines connected with the long distance system, which extends to all points of importance in the country. Some telegraph

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lines have been constructed along the railway between Pendleton and Pilot Rock, and in other places. Inasmuch as the telephone business has been created within the last few years this showing is considered as almost without an equal anywhere in a country of small towns and large wheat farms.

A JUVENILE TELEPHONE COMPANY.

SEVERAL boys appeared recently before the marshal of Redlands, California, with a petition for a telephone franchise. They announced that they had organized the Cypress and Brookside Telephone Company, and desired to construct a system connecting their homes. They had planned to use the poles of other companies, crossing streets by means of culverts. The line proposed is a mile long.

The marshal referred the boys to the city trustees. The president of the youthful enterprise is W. O. Branch, with H. B. Elliott and T. B. Branch as directors. The boys are the sons of a local minister. Two similar lines are already operated by the company.

ARBITRARY RATES IN OKLAHOMA.

THE corporation commission at Enid, Okla., has ordered a schedule of telephone service rates established which affects the entire state. Business telephones are to be $2.00 per month; office, $1.75; residence, $1.50; two-party telephones, $1.00, and party lines with more than two parties, $0.75.

Oklahoma has, as yet, no very large cities, and although exhaustive testimony was taken as to the conditions of telephone service, the problems peculiar to large exchanges were neither encountered nor considered by the commission.

In the ordinary lines of commercial exchange, a multiplication of units handled makes for a lower cost per unit. In

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telephone service, the value and expense of each unit is augmented by every additional unit, and increased capacity makes higher rates imperative.

No doubt the corporation commission's findings will be properly readjusted when growth and necessity shall demand such readjustment. But it may be observed that the closest, the most automatic and withal the most satisfactory regulation of rates comes not by legislation but by competition.

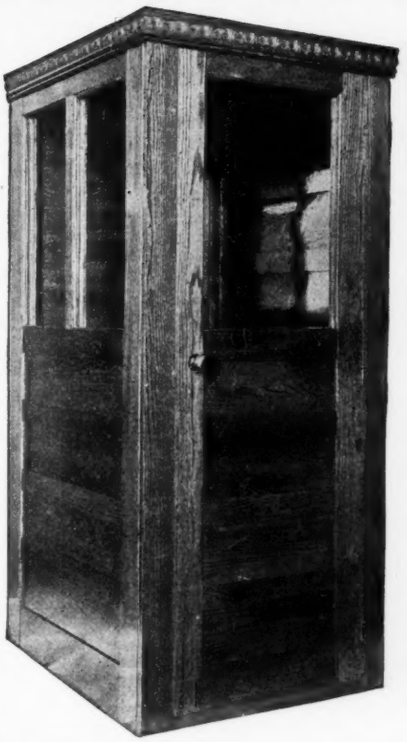
THE INVENTION OF THE VISUAL SIGNAL.

IN A paper read before the Institution of Electrical Engineers, in which he discusses conditions observed during his visit to this country last year, Sir William H. Preece says in part: "It is very gratifying to find the automatic visual signal . . . has become universal. It was my invention, introduced by the Postoffice in its first exchange in Newcastle in 1880, and used in every exchange erected subsequently in its system. I am sorry to say that not having secured this invention by patent in this country, I have failed to secure the credit of being its author, although my paper of 1893 and published books fully record the principle. It was introduced by the American Bell Company, with the central battery system using glow lamps instead of needles without any acknowledgment. It is true they used different means, but the principle is that introduced in the Postoffice system."

WESTERN BELL EXCHANGE SOLD.

CHARLES P. LUND of Spokane has become owner of the telephone system at Cheney, Washington. The Pacific States Telephone and Telegraph Company, owned and operated the exchange for a number of years. Last summer, when the commercial club insisted that a better

Sound Proof Booths



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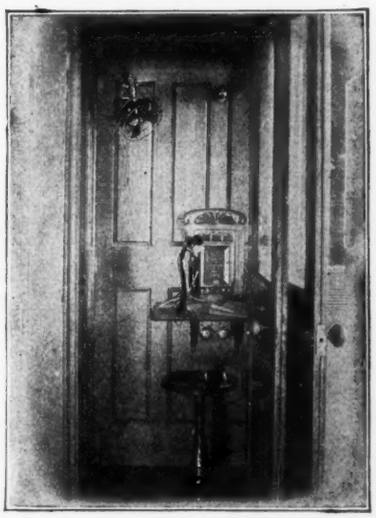

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equipment should be installed and a better service rendered, the company offered to sell the exchange because it did not care to make further improvements here. The exchange then passed into the hands of W. T. Du Bois, former manager of the company. Mr. Lund will make improvements in the way of putting in new office equipment and extending the lines. It was through the efforts of Mr. Lund, who is president of the board of trustees of the Washington State Normal School, that Cheney secured the electric line recently completed by the Washington Water Power Company of Spokane.

SQUIRRELS IN CABLE BOX.

TELEPHONE service in the northeast section of Akron, Ohio, was tied up for a week when linemen located the trouble in a cable box at the top of a telephone pole, where a park squirrel had broken in and gnawed away the insulation. The squirrel had a cozy nest inside the box, with a large family of little squirrels. When the telephone men approached the box the mother showed fight, and rather than harm her they notified the board of public service, who sent a park man to remove the nest.

SWISS TELEPHONE SERVICE.

THE telephone service in Switzerland is divided into eleven sections, one of them including the entire consular district of Geneva. In any one of the eleven sections everybody has the right to have transmitted, by writing and by postman, messages intrusted by telephone to the central office of the telephone, or given in writing to any telegraph office. "Phonograms" must be sent by the administration to any consignee, a subscriber to the telephone in the same section; or to any consignee if domiciled within

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HENNEPIN CANAL TELEPHONE SYSTEM.

THE United States government has begun work on a complete telephone system to extend the entire length of the Hennepin canal in Illinois. The idea was conceived by Major C. S. Riche, head of the local United States engineer's office, and Captain L. L. Wheeler, stationed at Sterling, will execute the plans outlined for the work. The central office of the system will be at Feeder Junction, near Sterling, and from this office the line will run to the Illinois river and another line down the canal to the Mississippi.

It is figured that during the season of navigation telephones will be in dire need for communication between the different points along the canal, especially when government officials are making trips. The system will be one of the most complete and up-to-date known, and will be identified with the farmers' lines and the other systems running along the canal.

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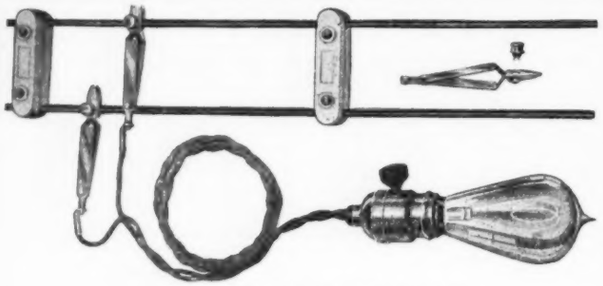

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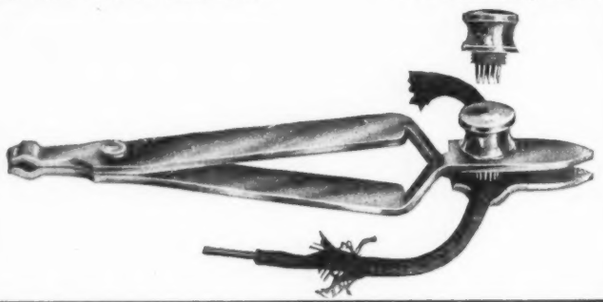

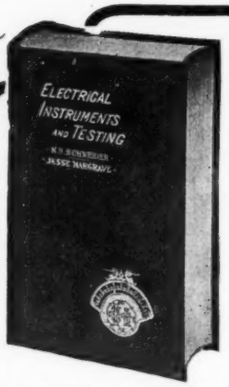

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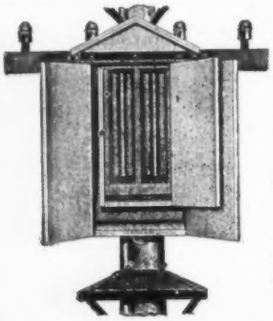

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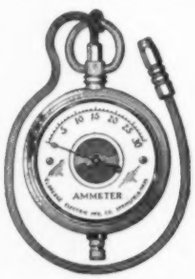

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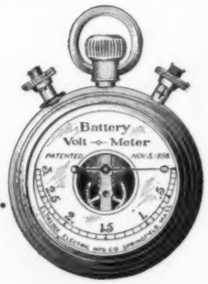

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Fibre Conduit Co., Orangeburg, N. Y.

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American Sewer Pipe Co., Pittsburg, Pa.
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McRoy Clay Works, Brazil, Ind.

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Cook, Frank B., Chicago.
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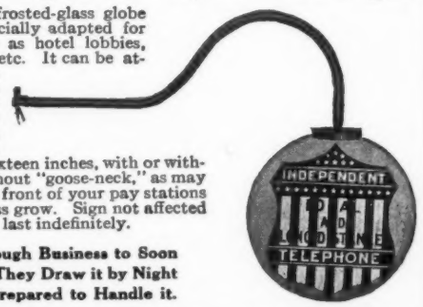

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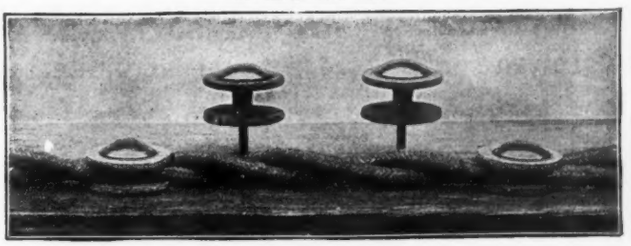

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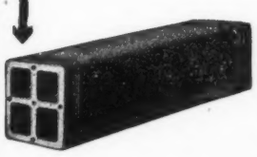

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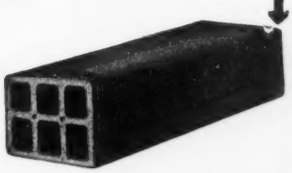

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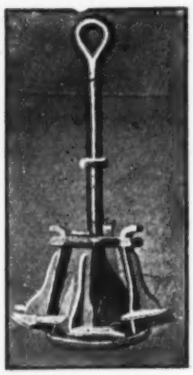

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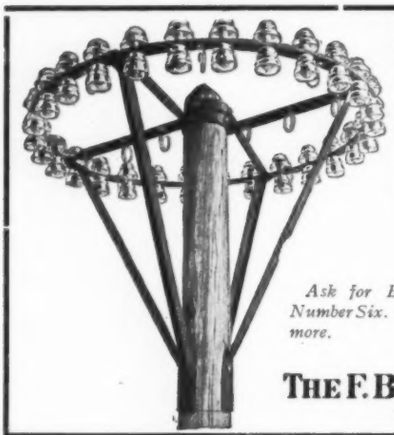

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International Telephone Mfg. Co., Chicago, Ill.
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Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
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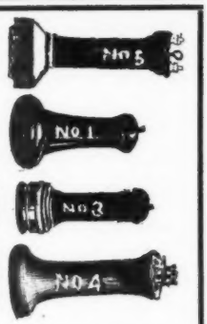

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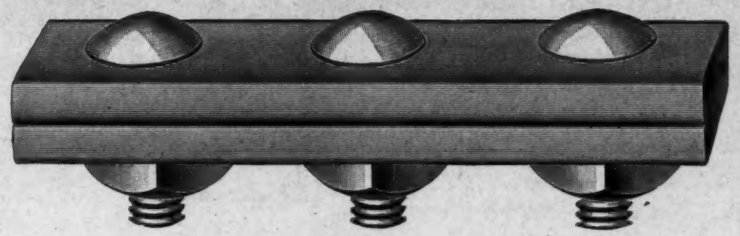

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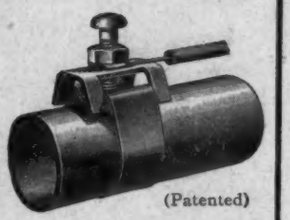

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